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Lee et al.

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(54) **CAMERA DEVICE COMPRISING A STRUCTURE FOR DISPOSITION OF A GYRO SENSOR**

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H04N 5/335 (2011.01)

G03B 5/00 (2021.01)

(Continued)

(52) **U.S. Cl.**

CPC **H04N 23/57** (2023.01); **G03B 5/00** (2013.01); **H04N 23/54** (2023.01); **H04N 23/6812** (2023.01); **G03B 2205/0069** (2013.01)

(58) **Field of Classification Search**

CPC G03B 2205/0069

See application file for complete search history.

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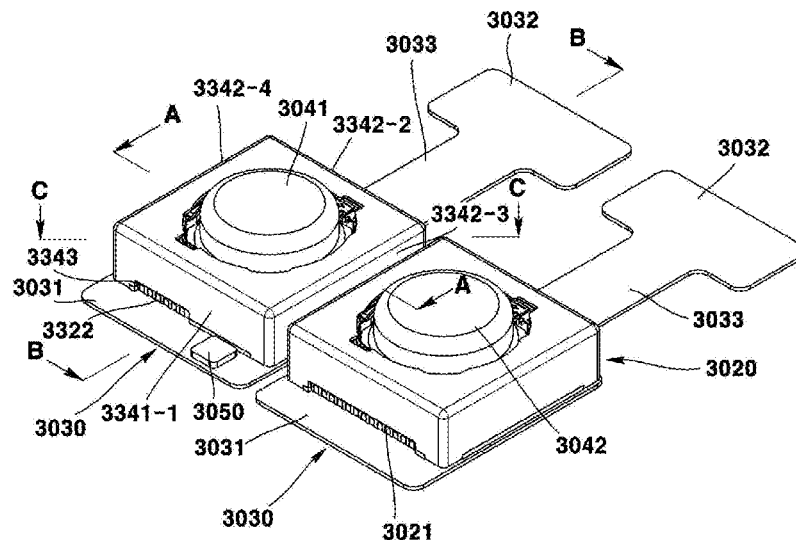
Primary Examiner — Gary C Vieaux

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(57) **ABSTRACT**

The present embodiment relates to a camera device comprising a printed circuit board, a gyro sensor, and a first lens driving device, wherein the first lens driving device includes a cover member, a bobbin, a magnet, a coil and a substrate, the gyro sensor is arranged to be closest to a first lateral plate from among first to fourth lateral plates of the cover member, the substrate includes a first terminal unit and a plurality of terminals, which are arranged at the first terminal unit and are electrically connected to the printed circuit board, and the first terminal unit of the substrate is arranged at a location corresponding to the first lateral plate of the cover member.

20 Claims, 41 Drawing Sheets



(51)	Int. Cl.								
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FIG. 1

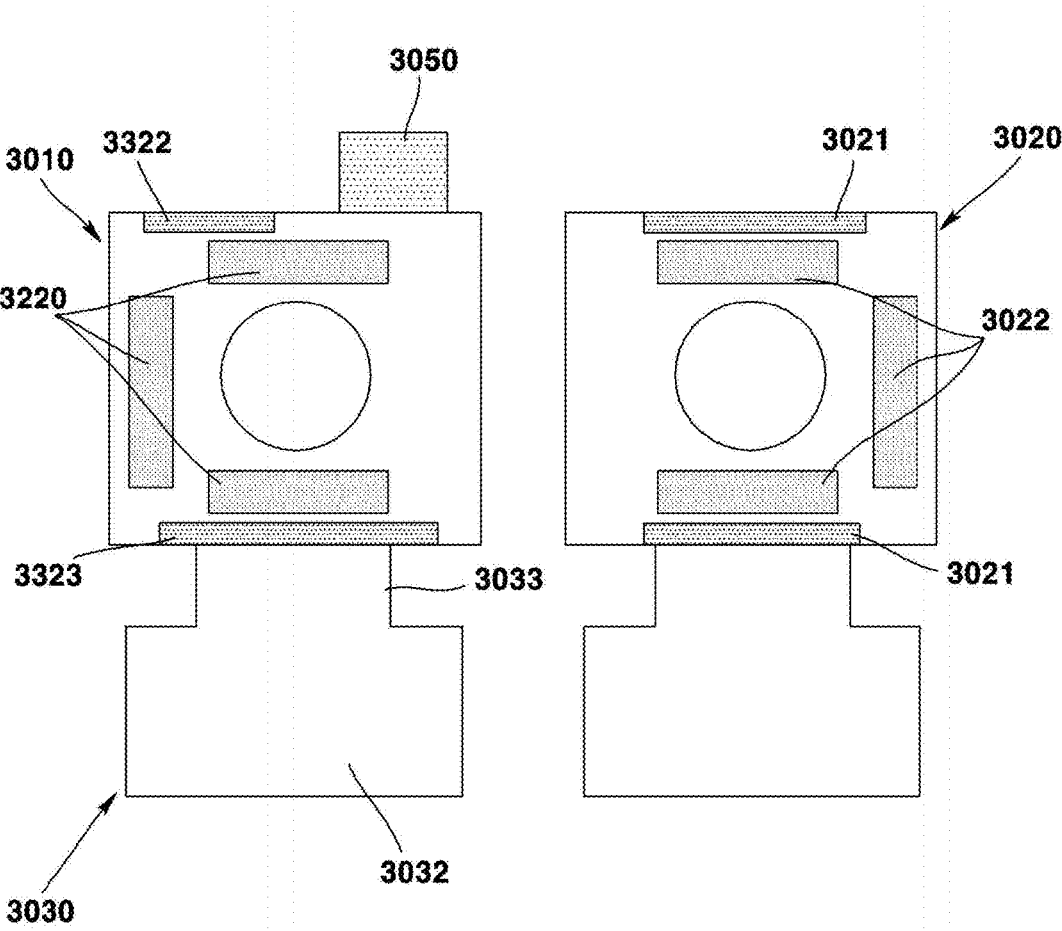


FIG. 2

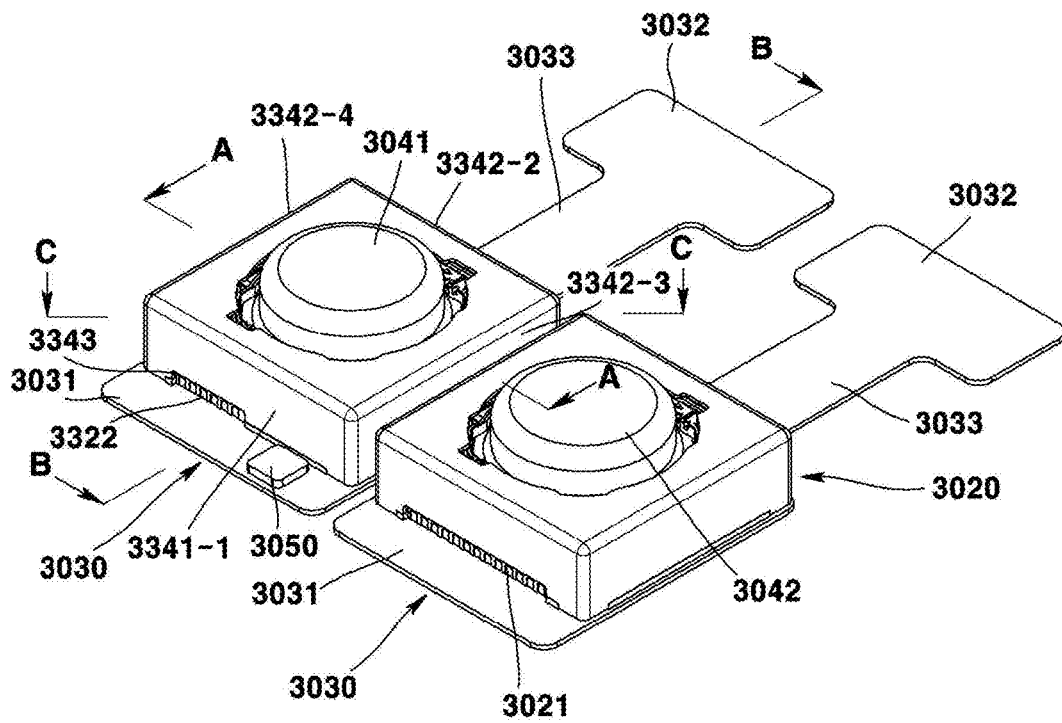


FIG. 3

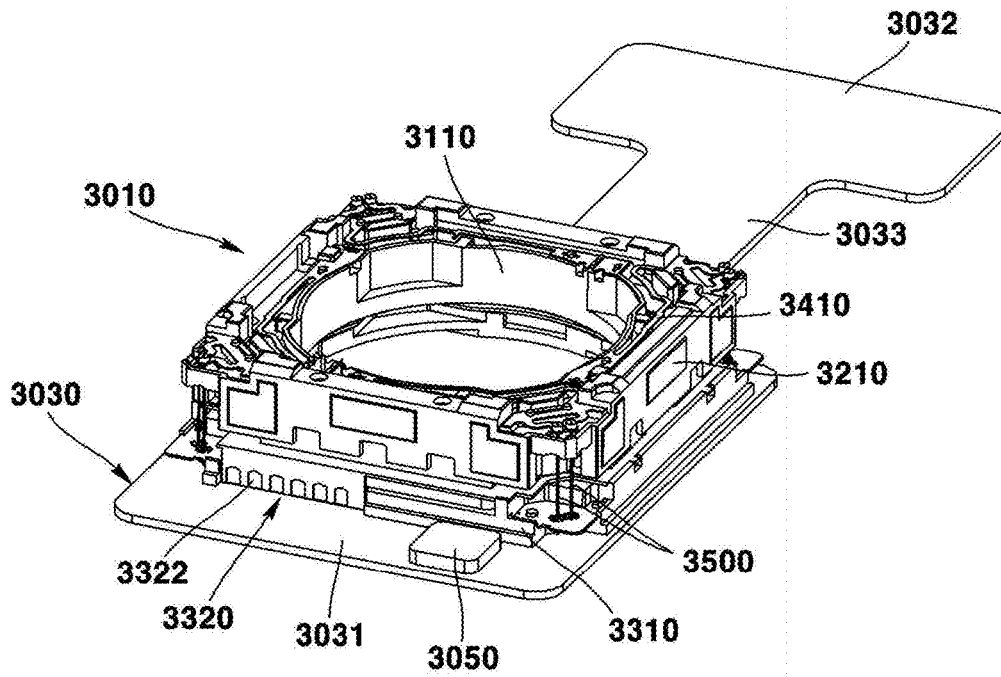


FIG. 4

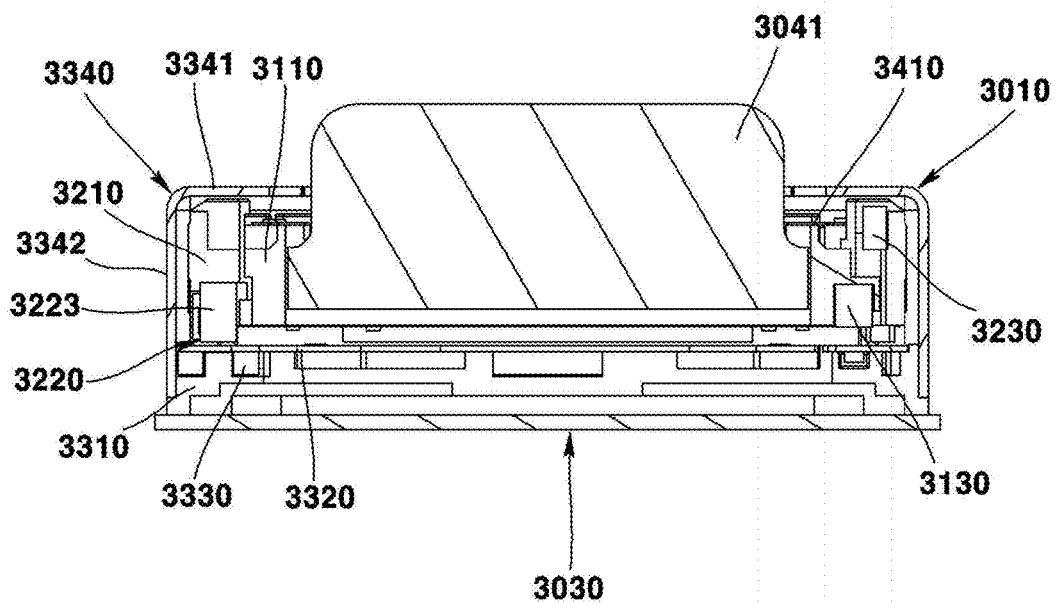


FIG. 5

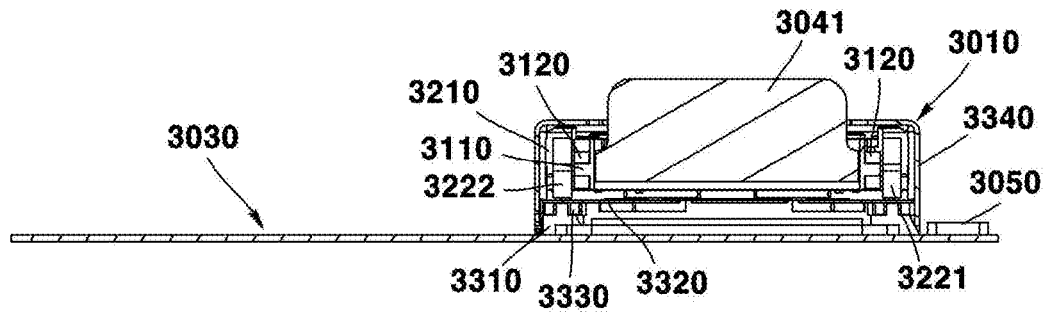


FIG. 6

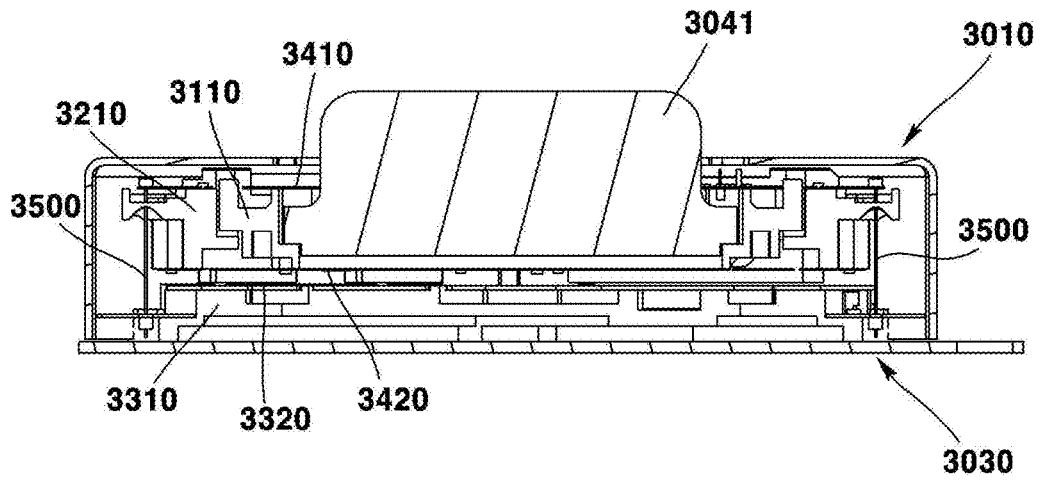


FIG. 7

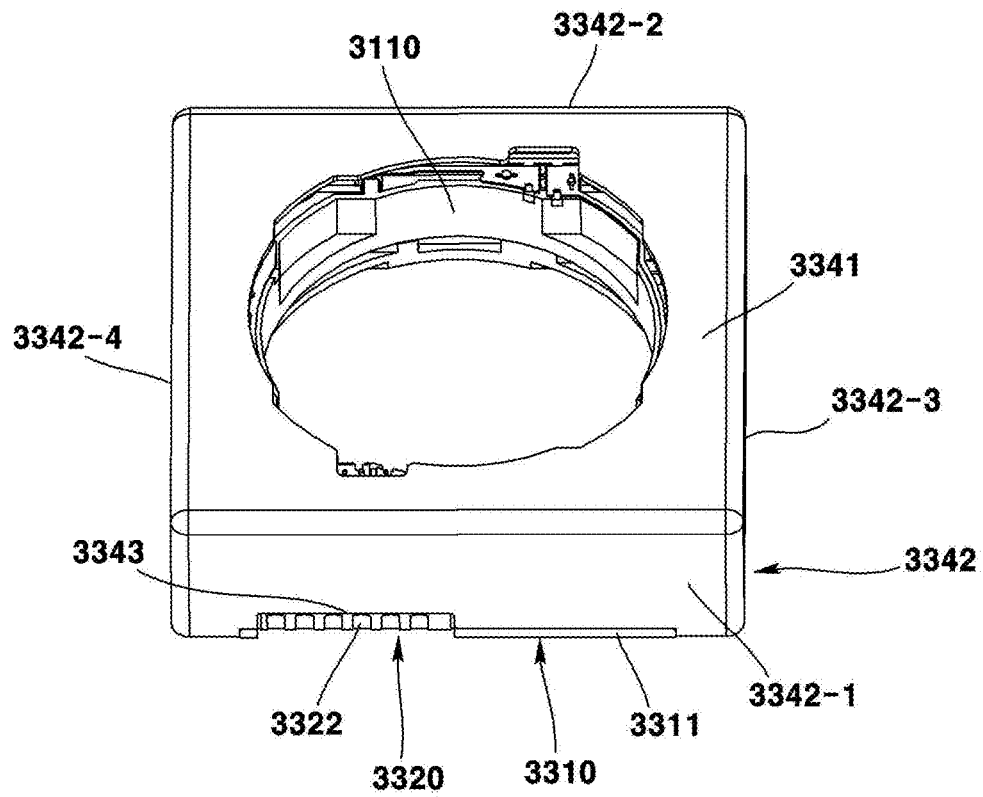


FIG. 8

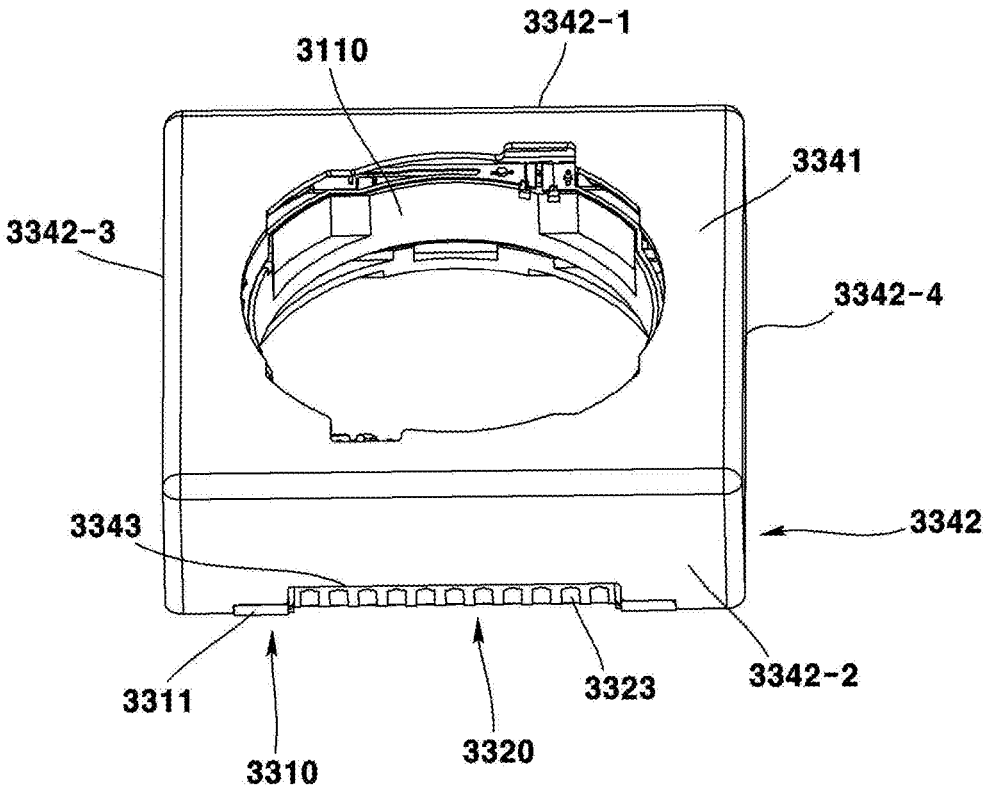


FIG. 9

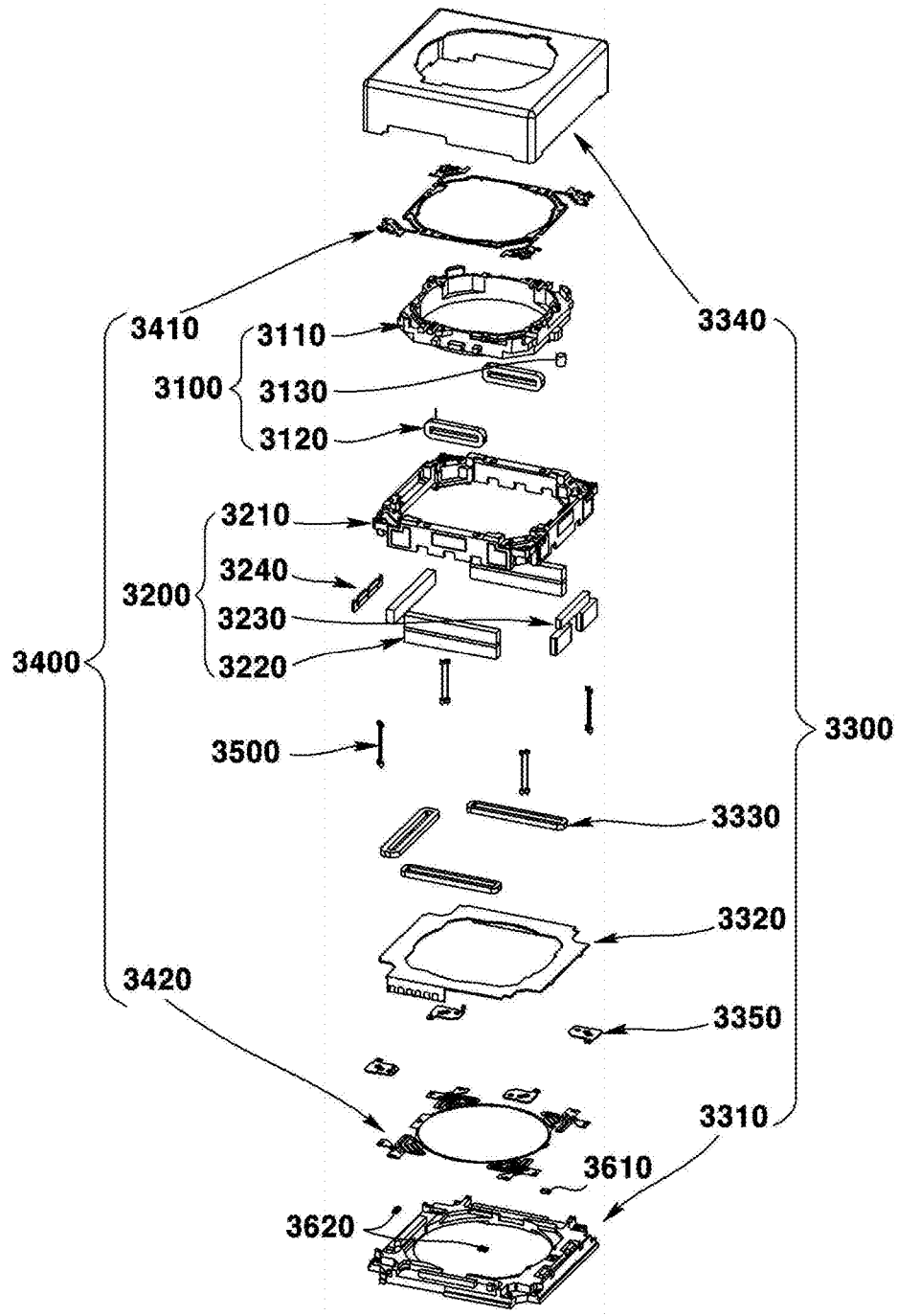


FIG. 10

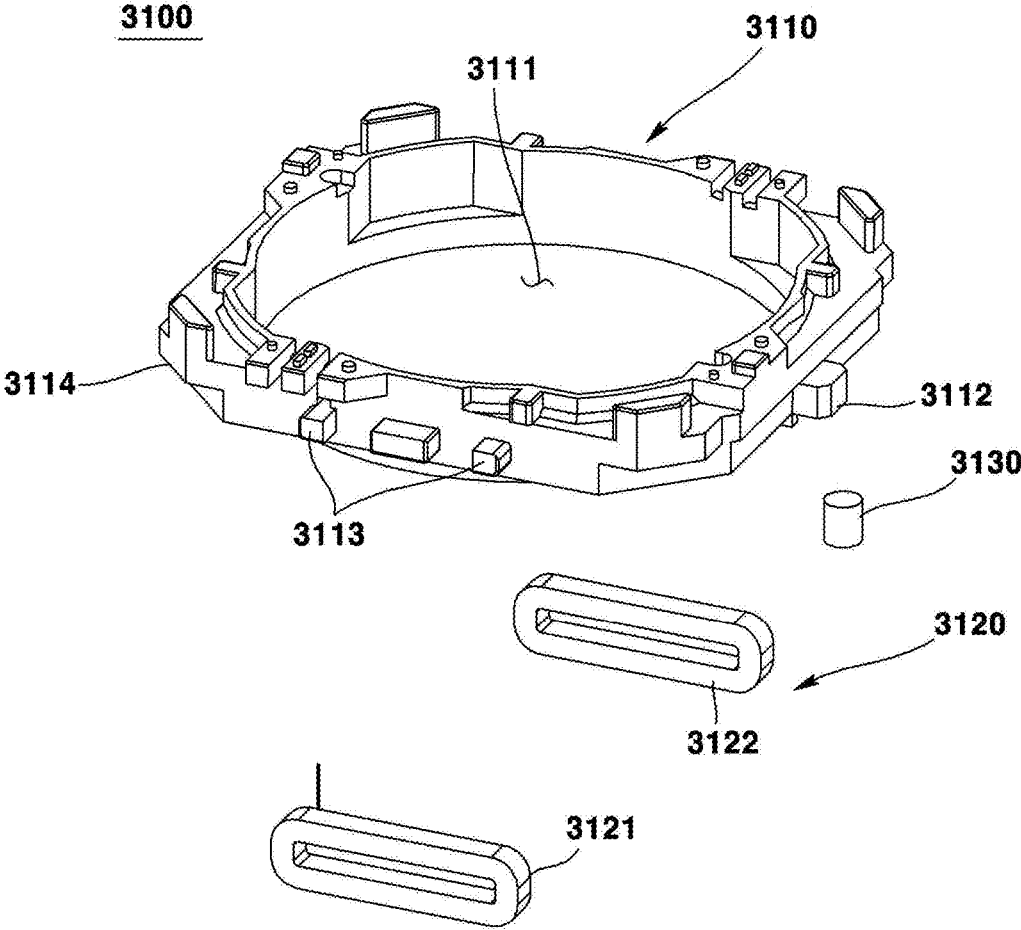


FIG. 11

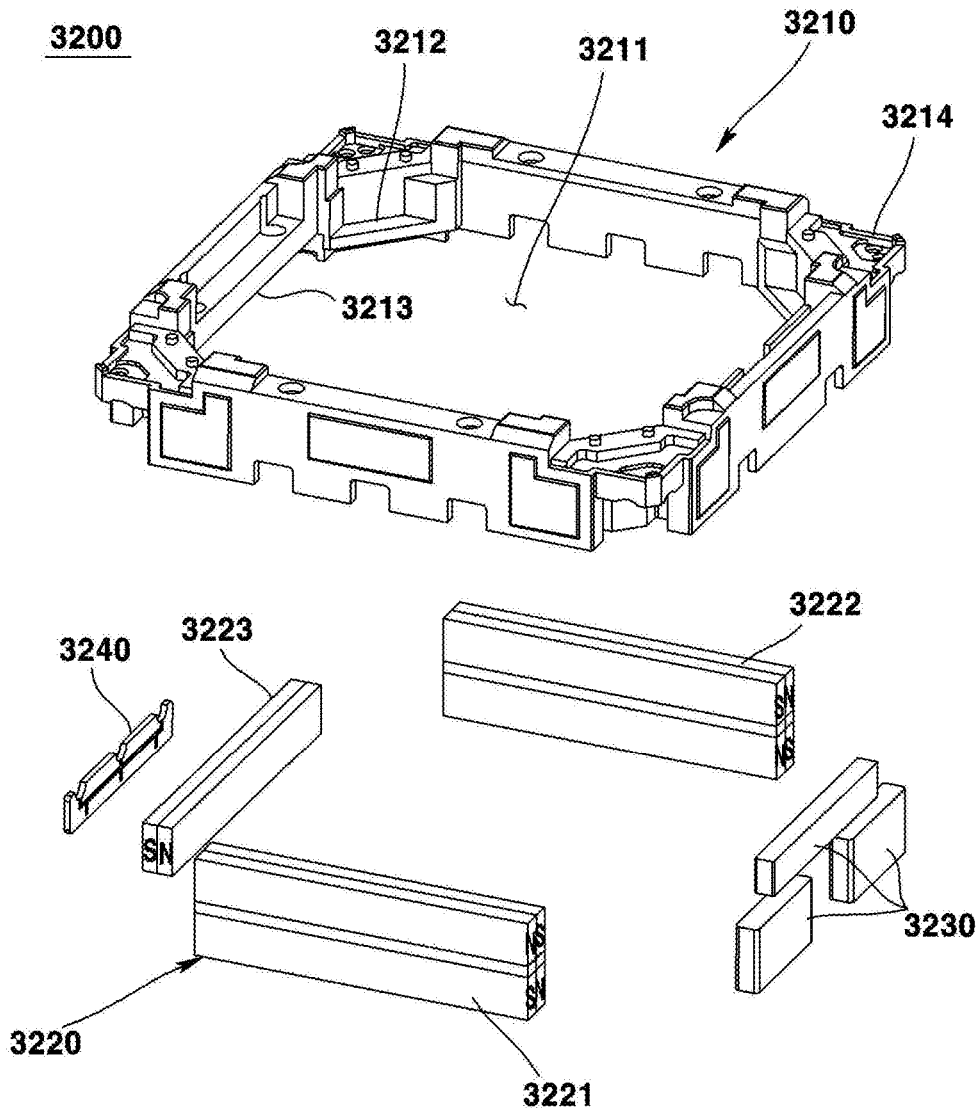


FIG. 12

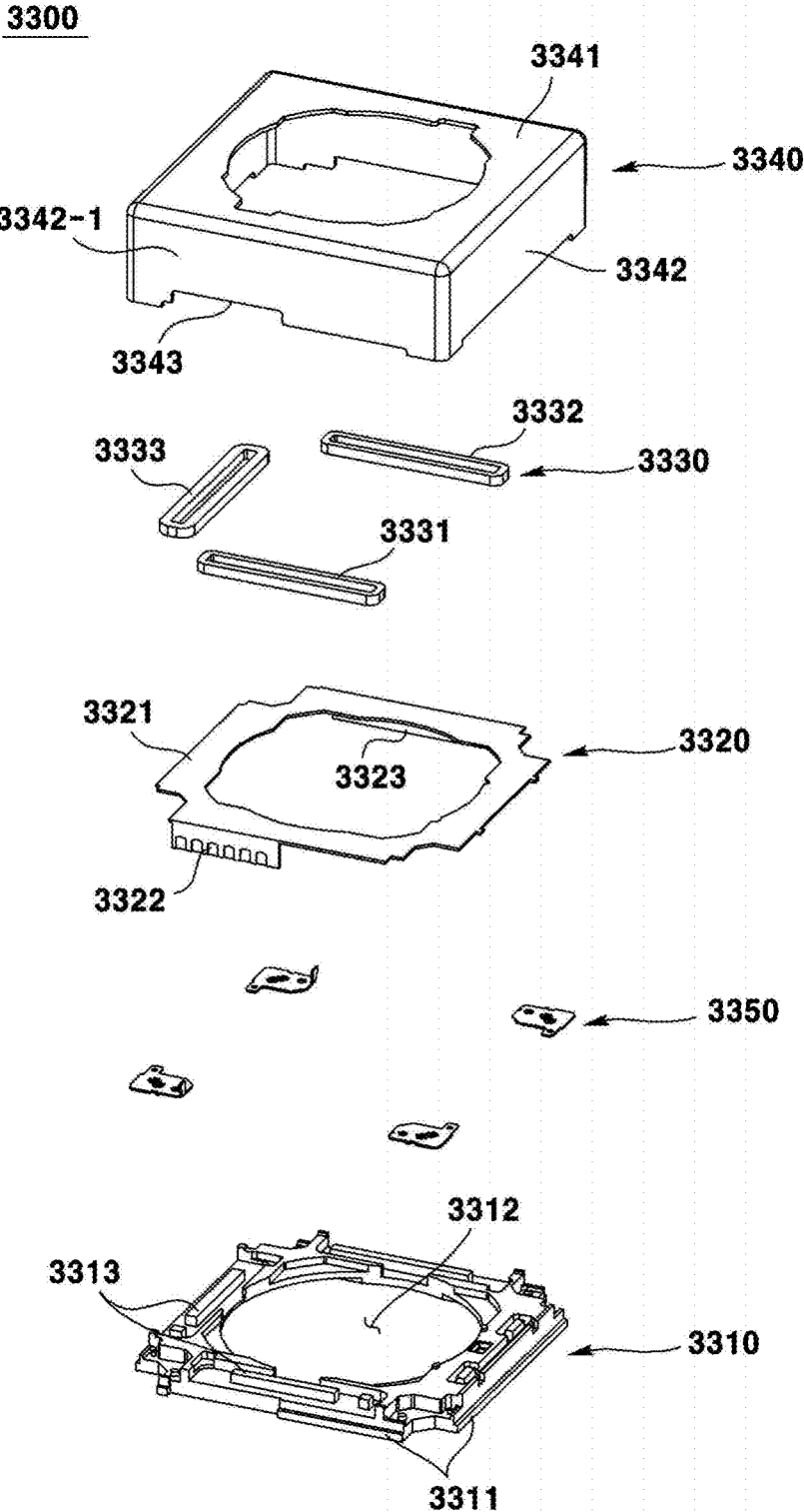


FIG. 13

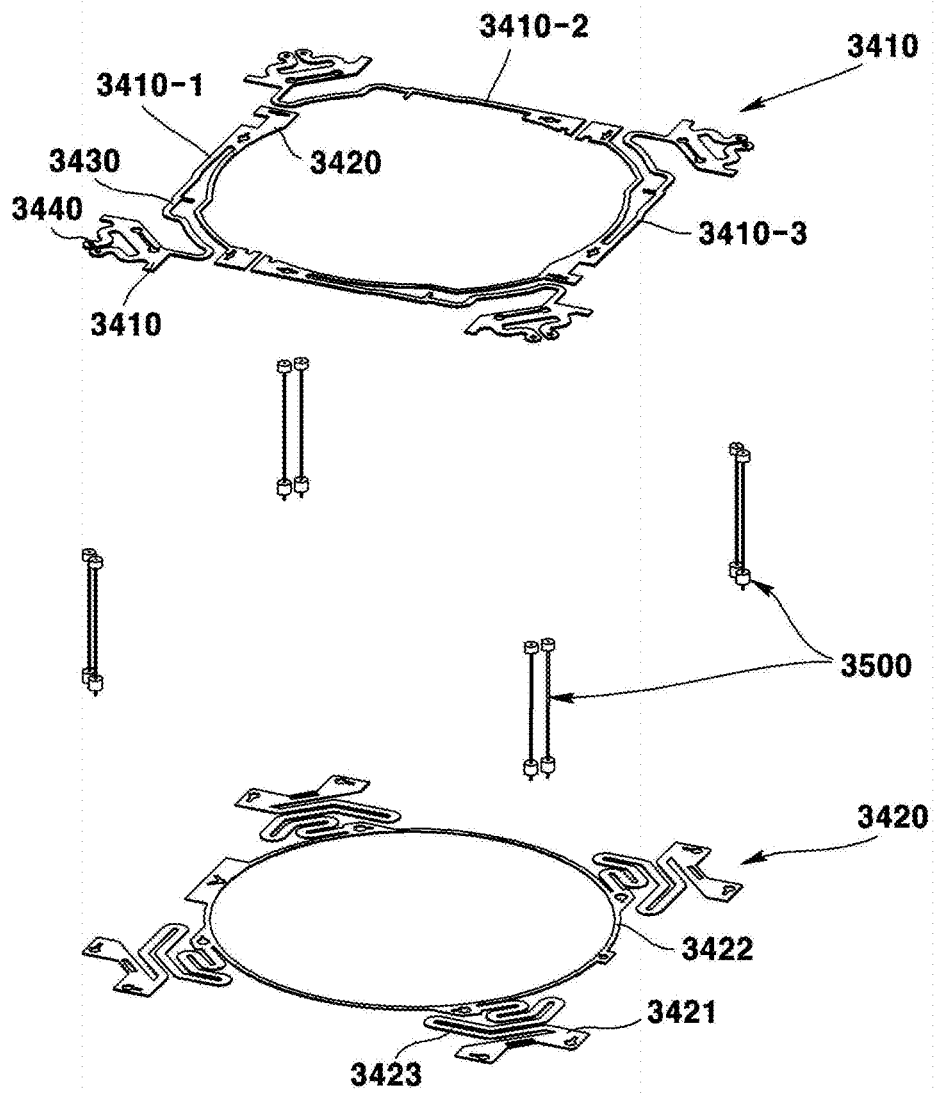


FIG. 14

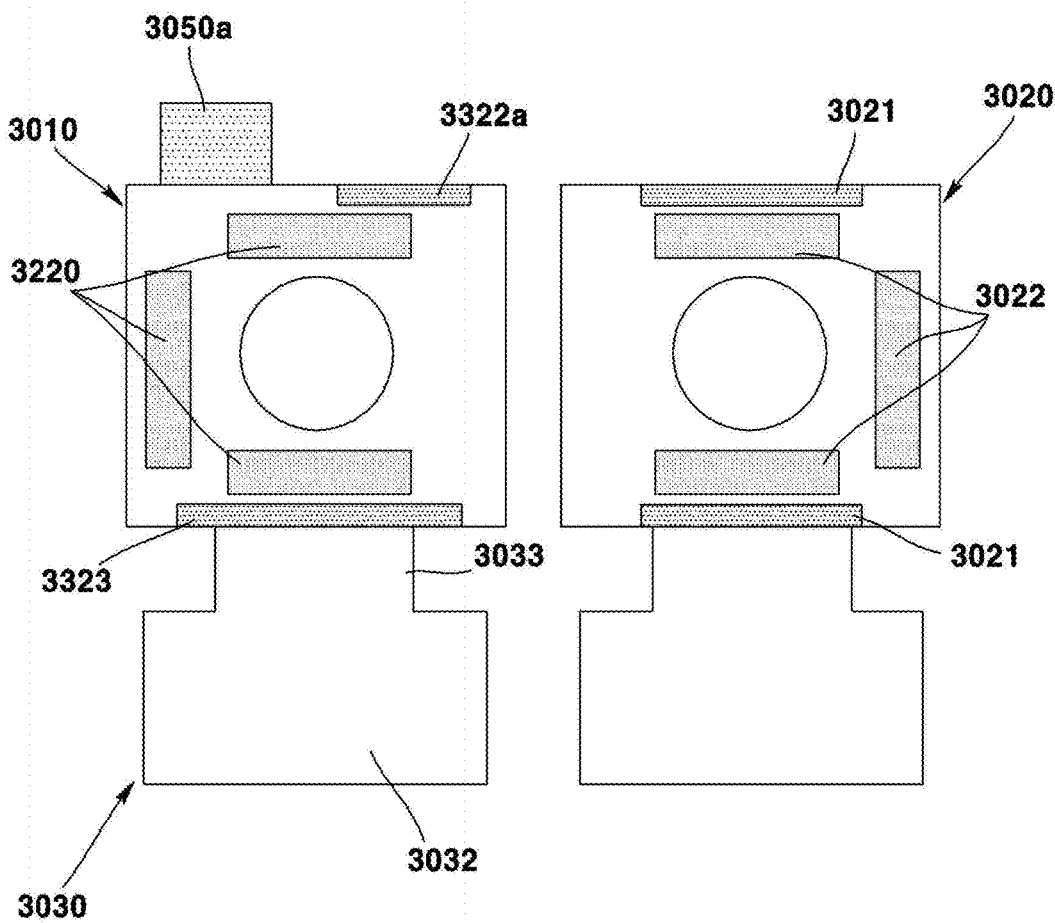


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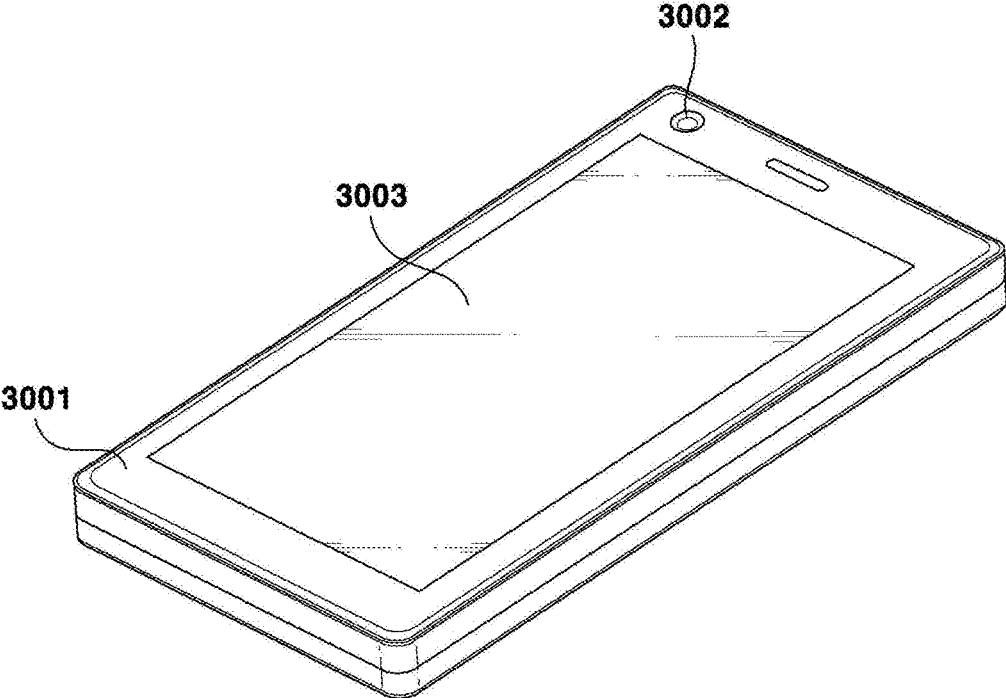


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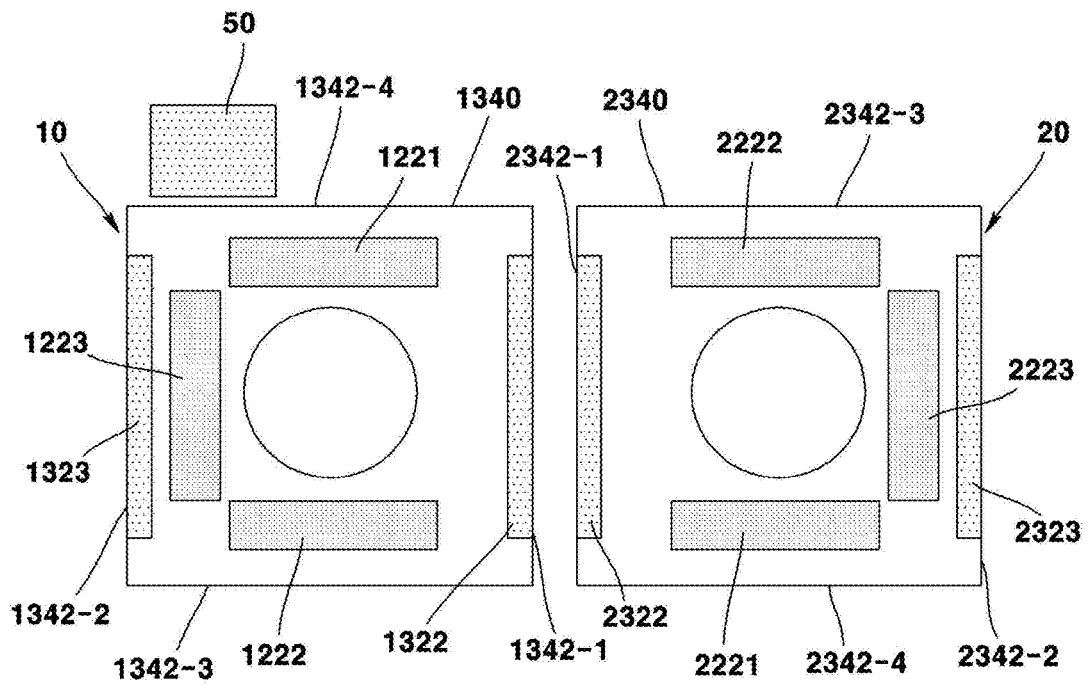


FIG. 17

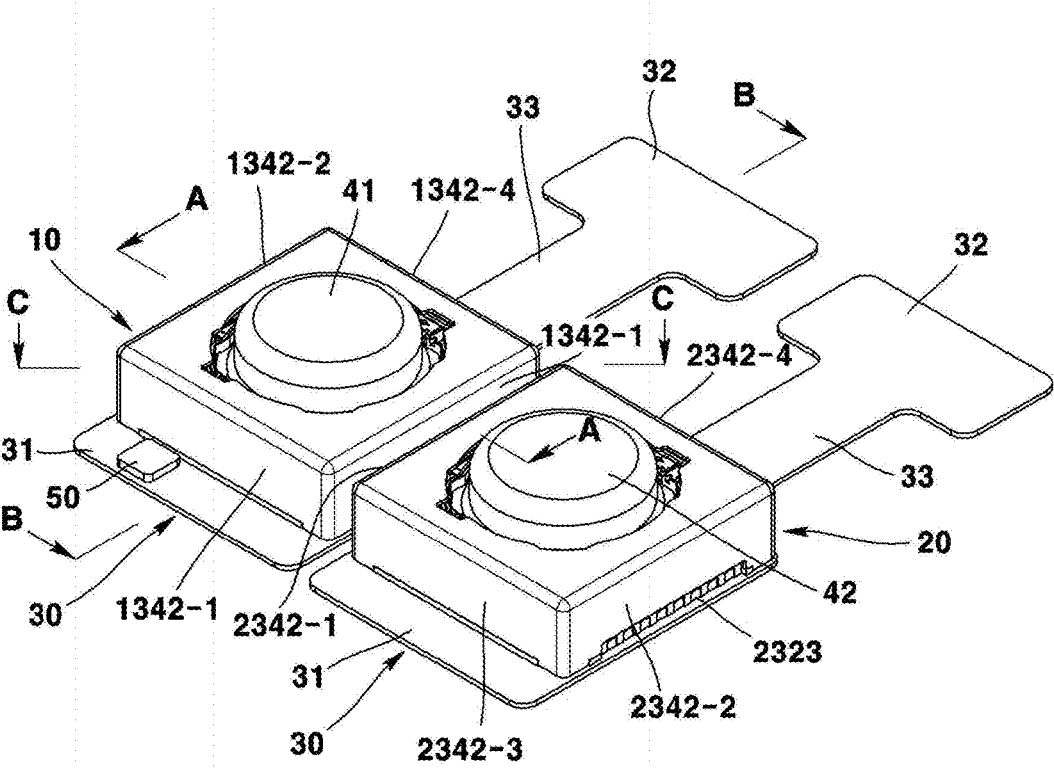


FIG. 18

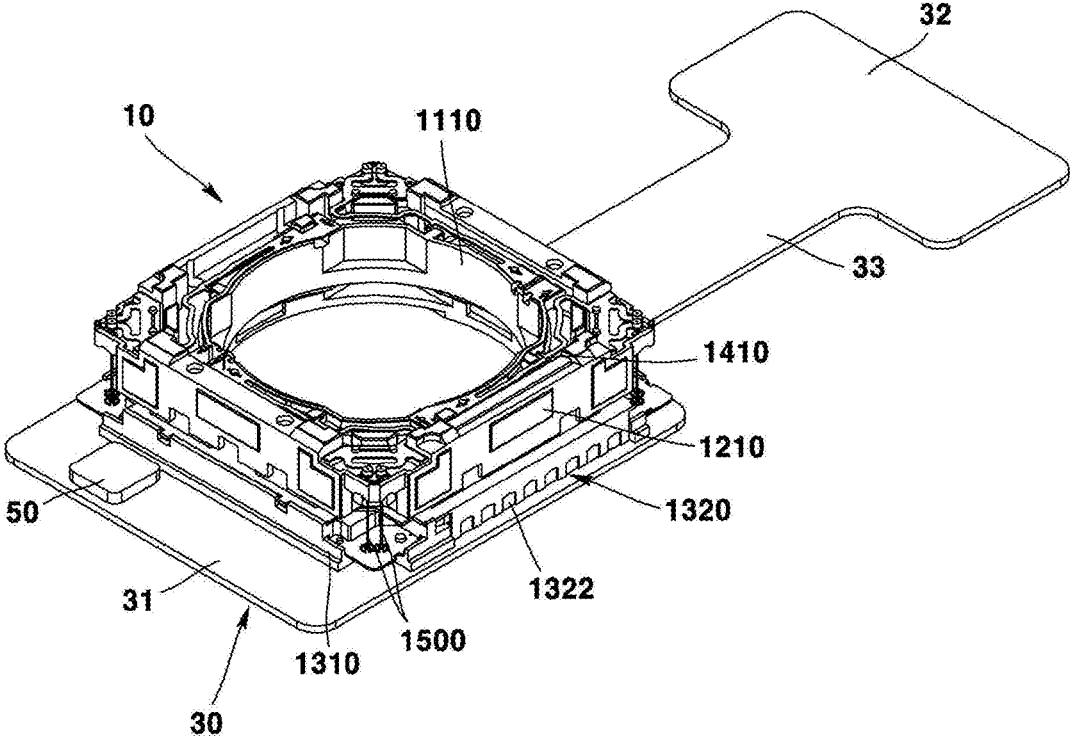


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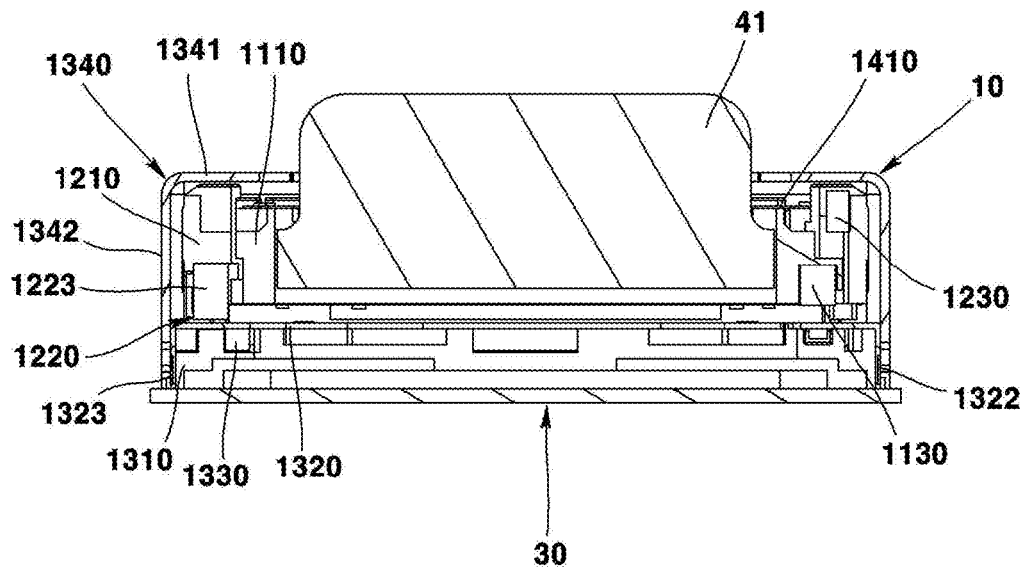


FIG. 20

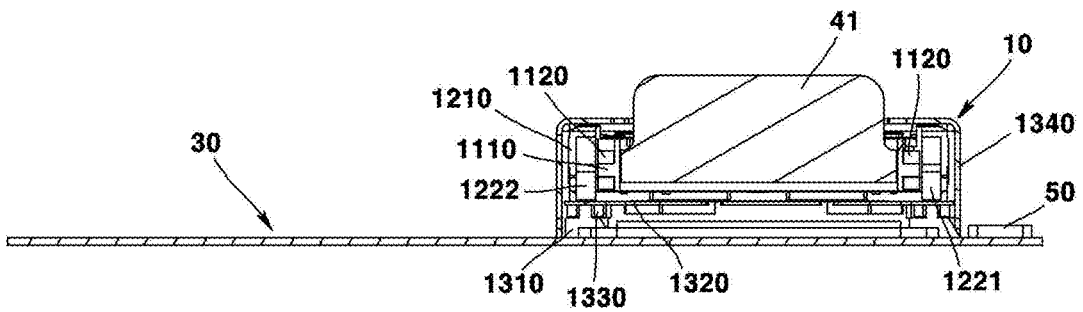


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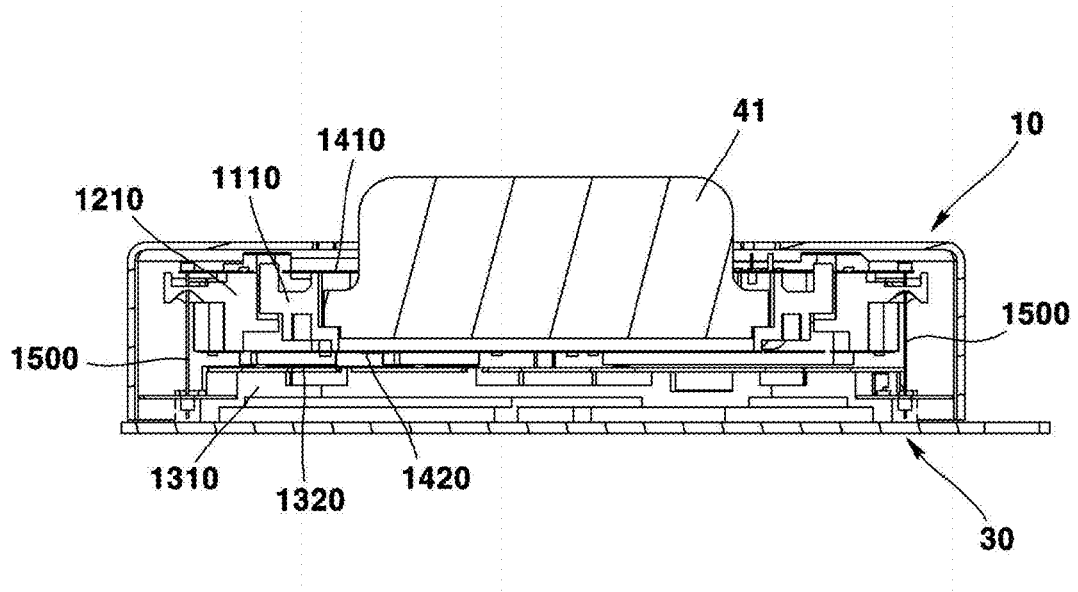


FIG. 22

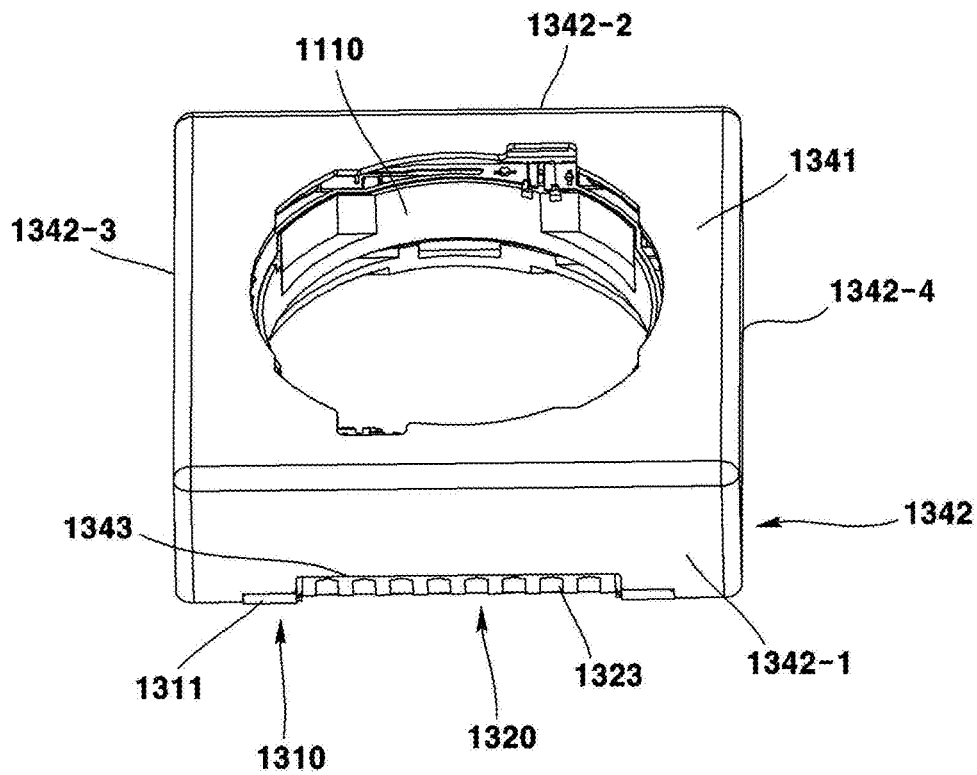


FIG. 23

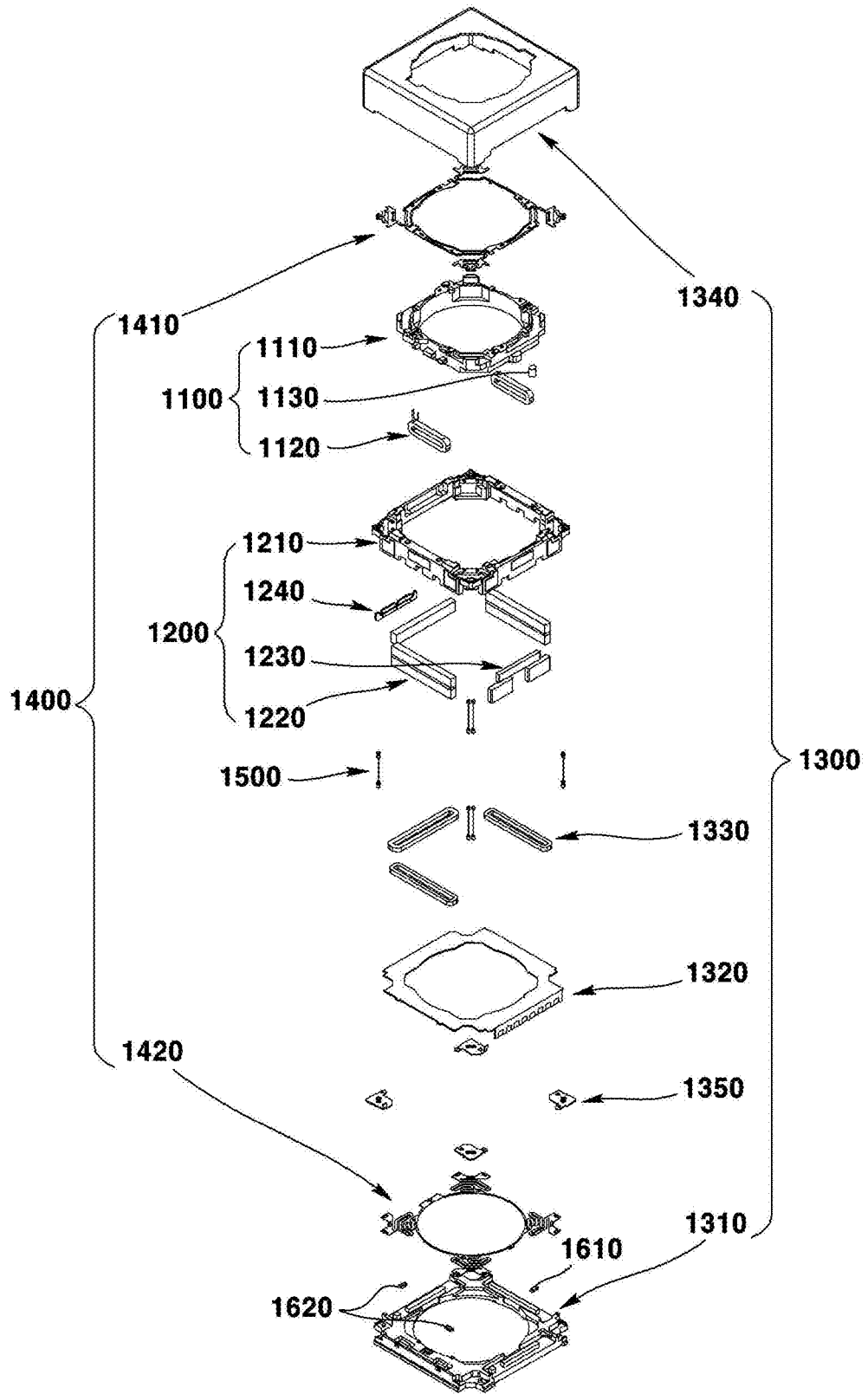


FIG. 24

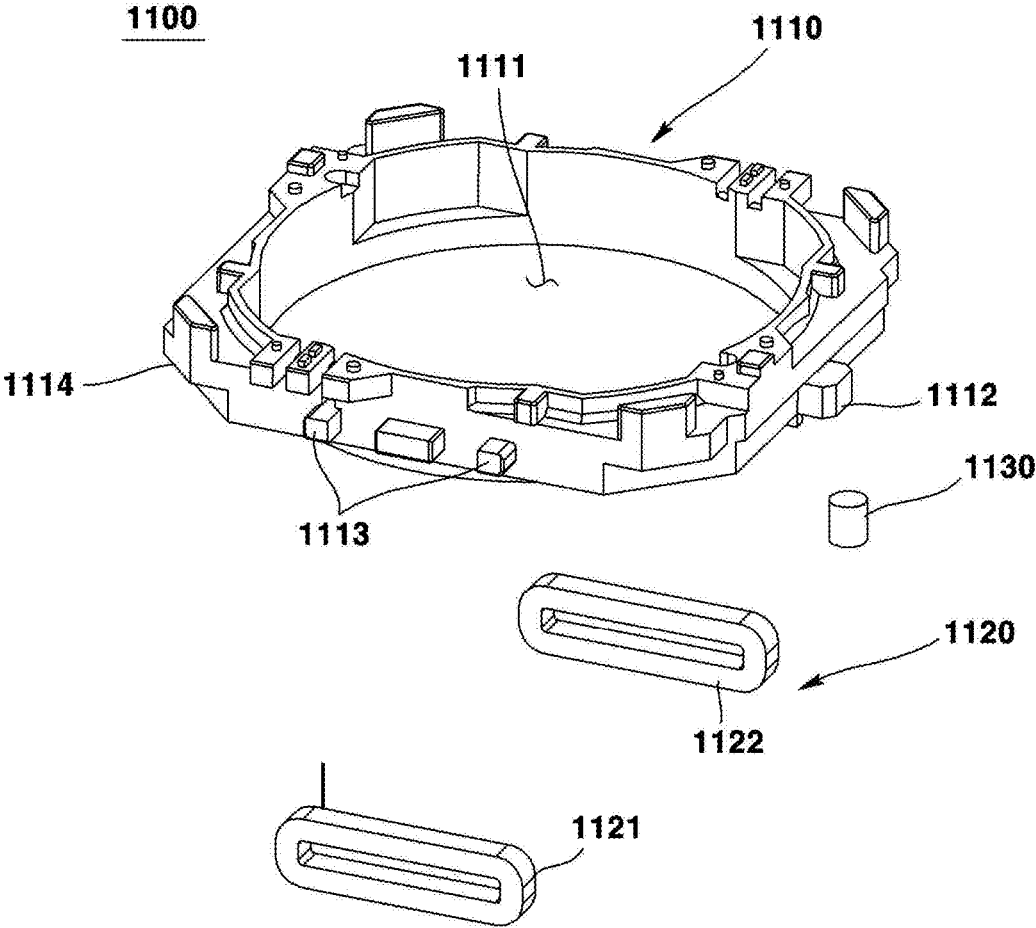


FIG. 25

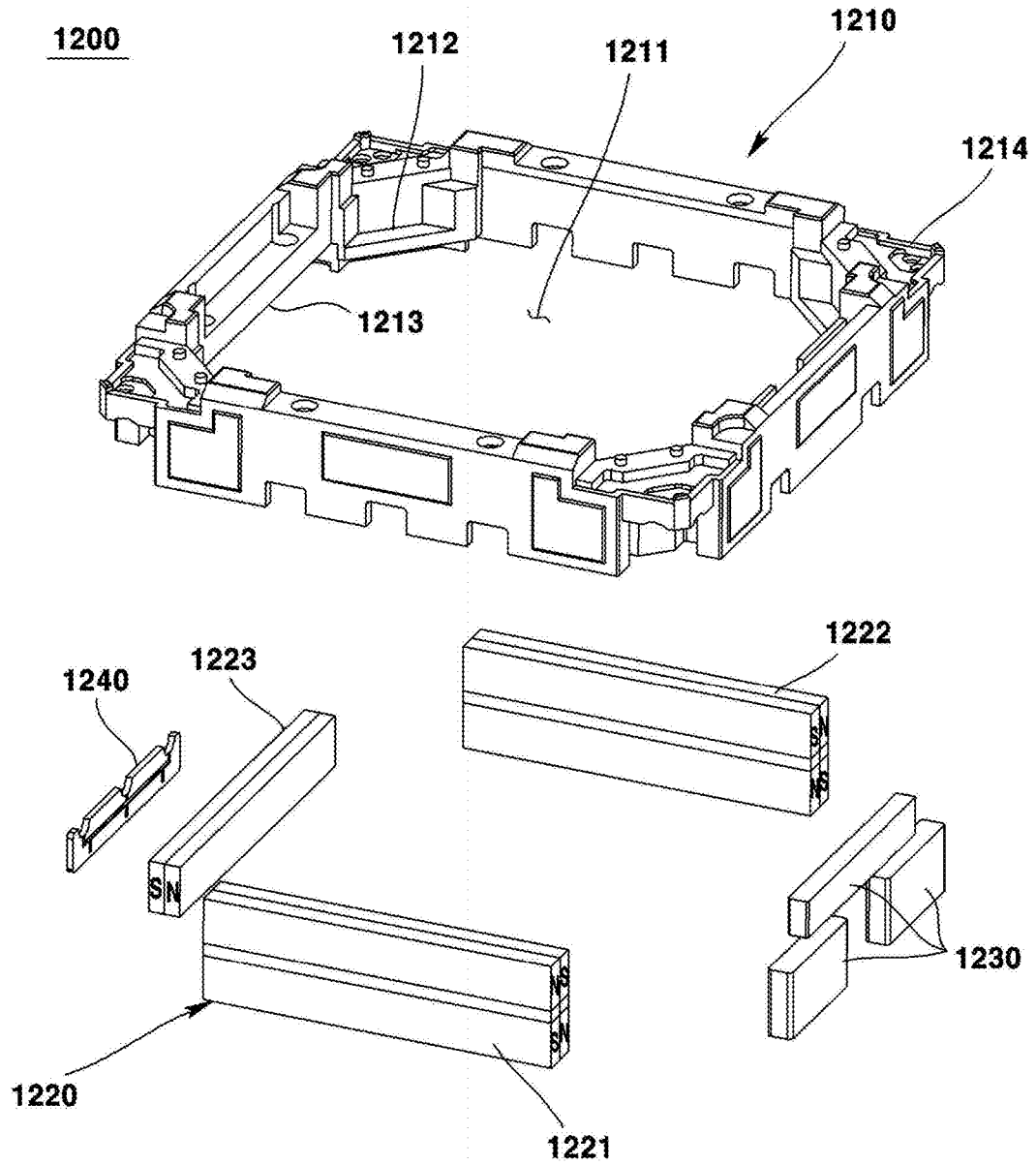


FIG. 26

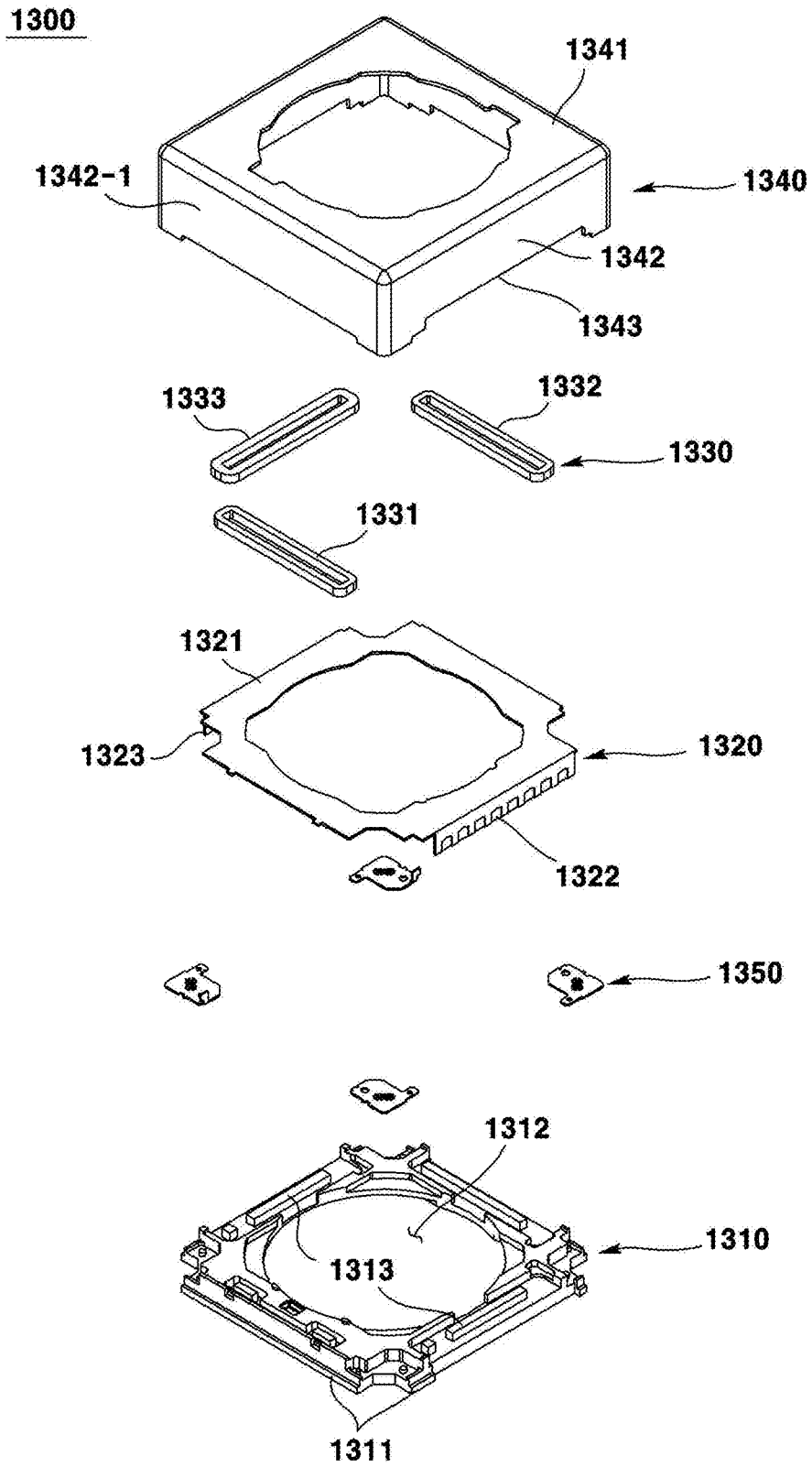


FIG. 27

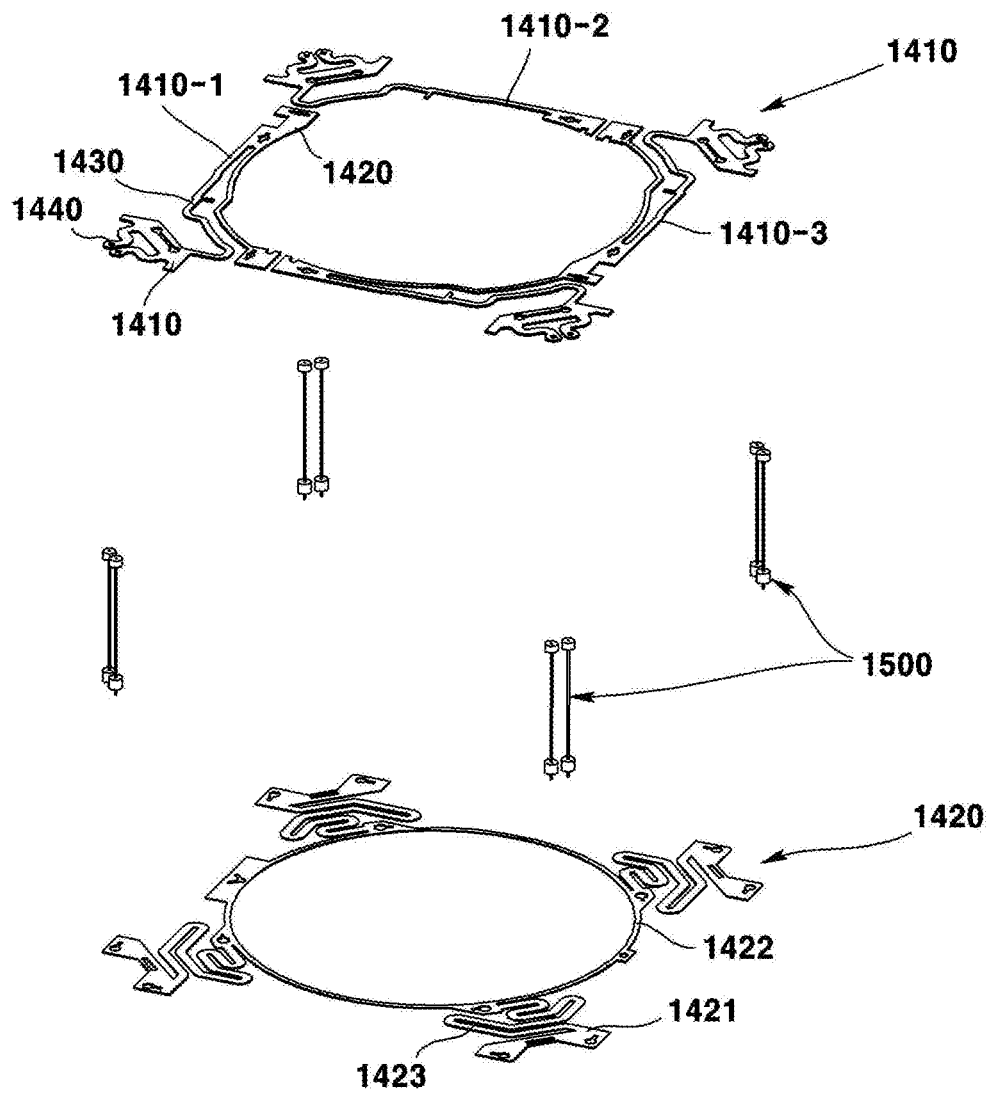


FIG. 28

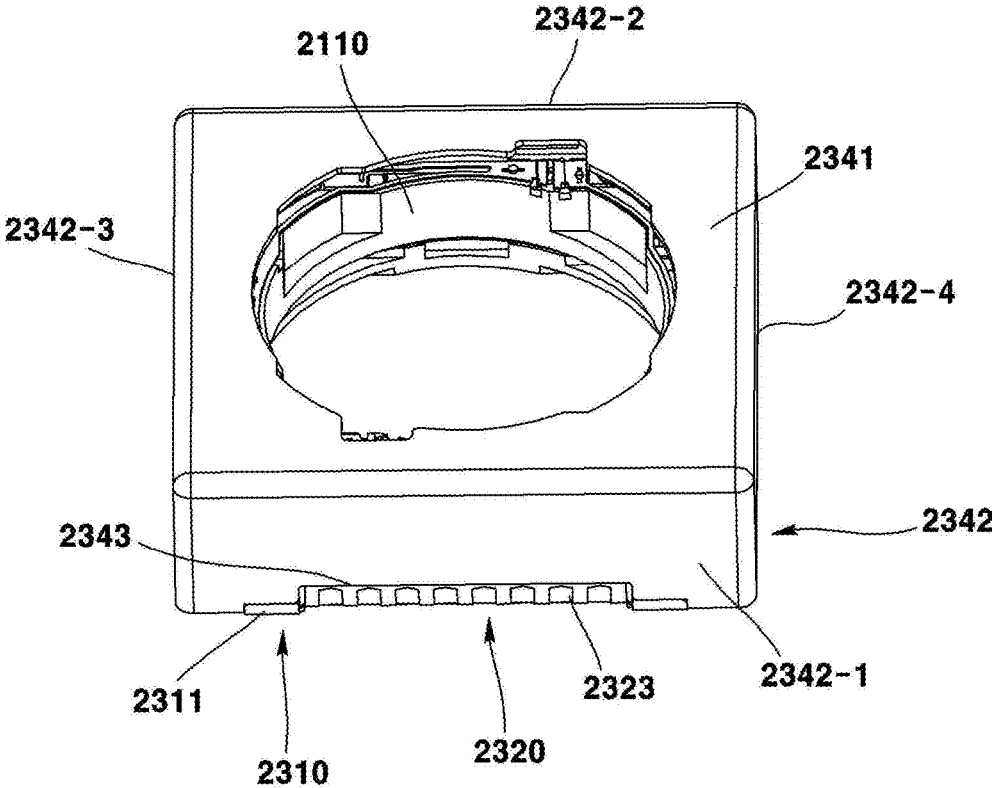


FIG. 29

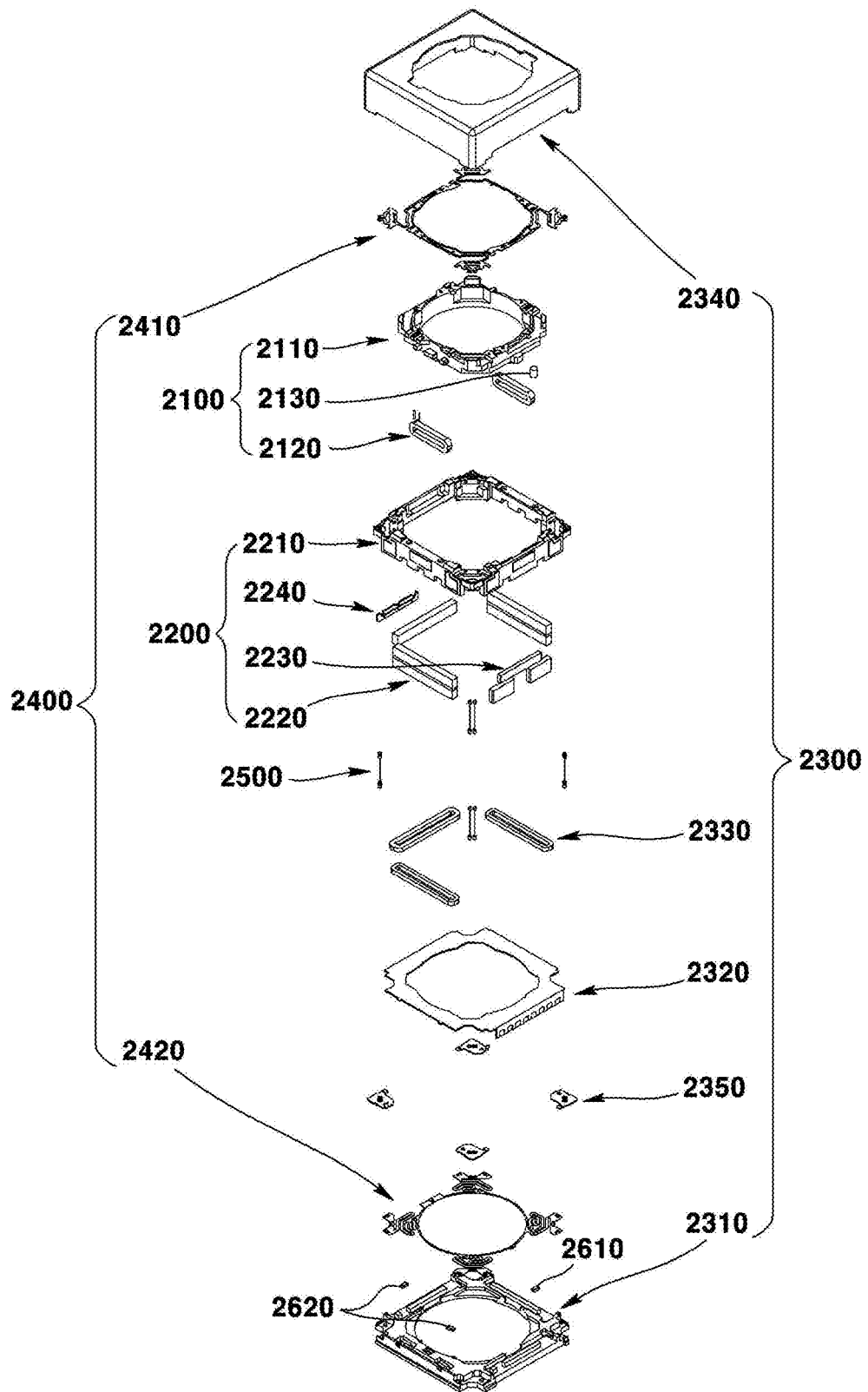


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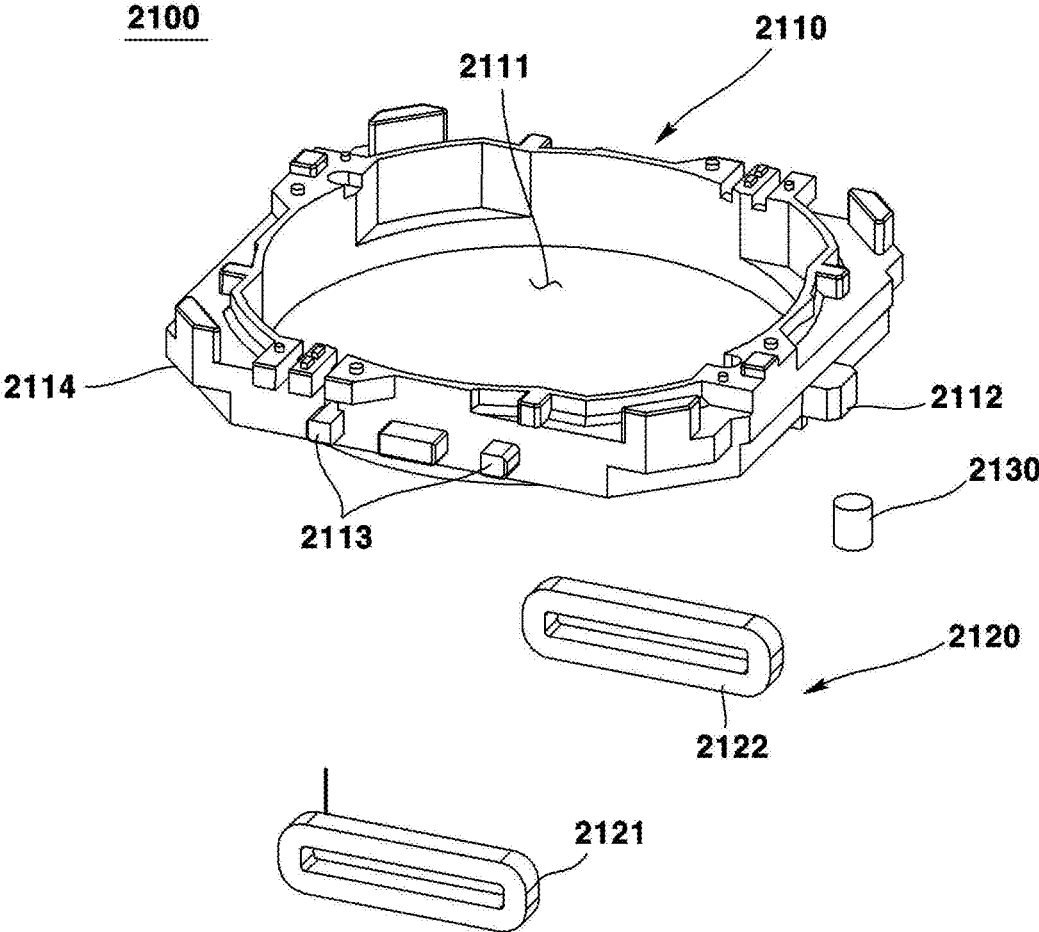


FIG. 31

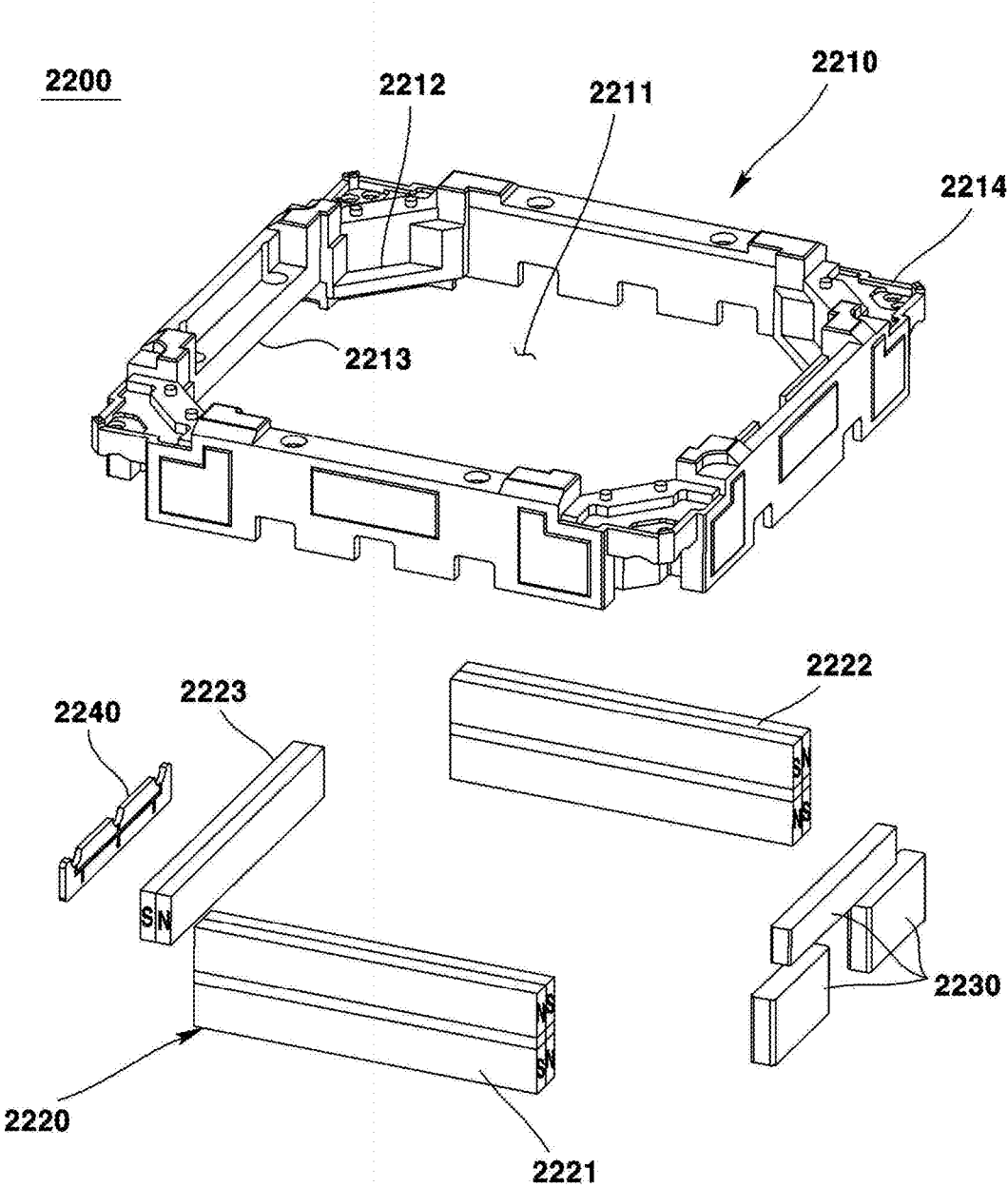


FIG. 32

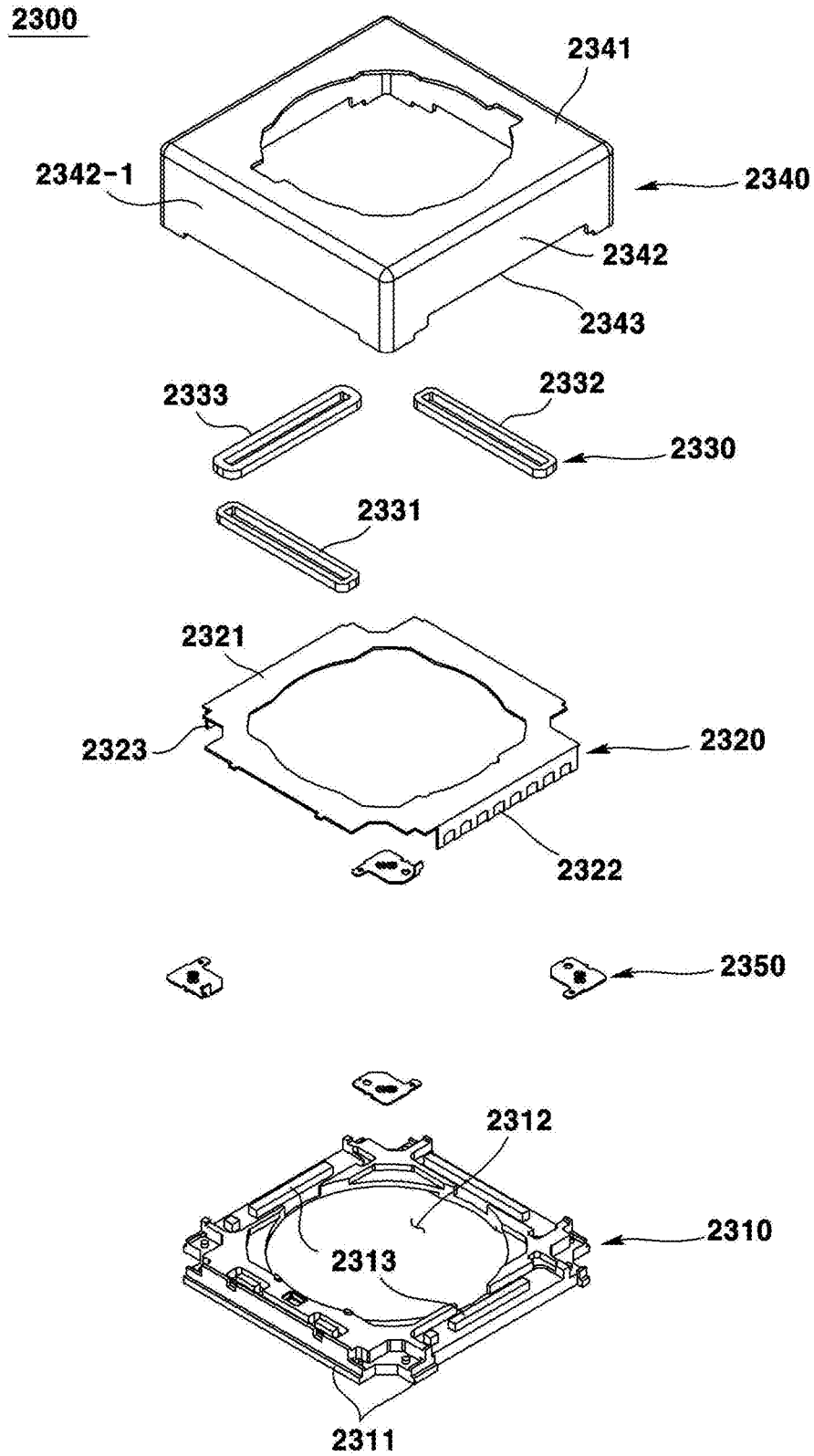


FIG. 33

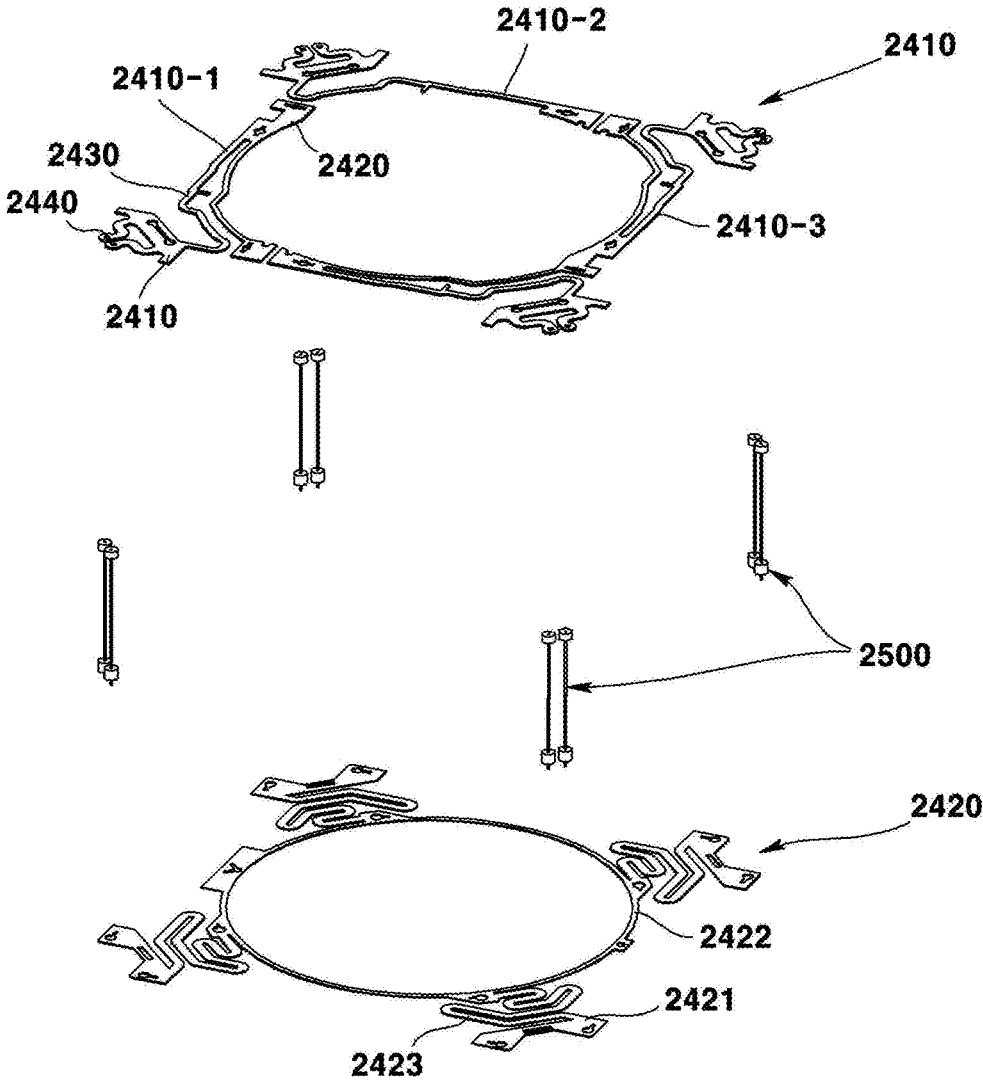


FIG. 35

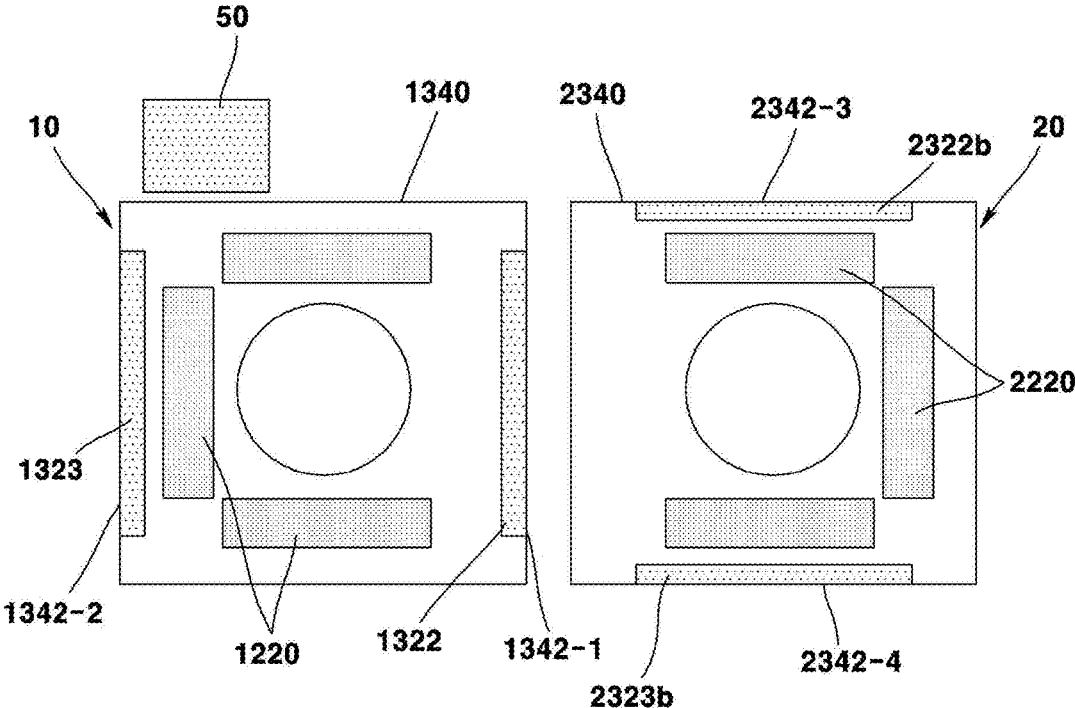


FIG. 36

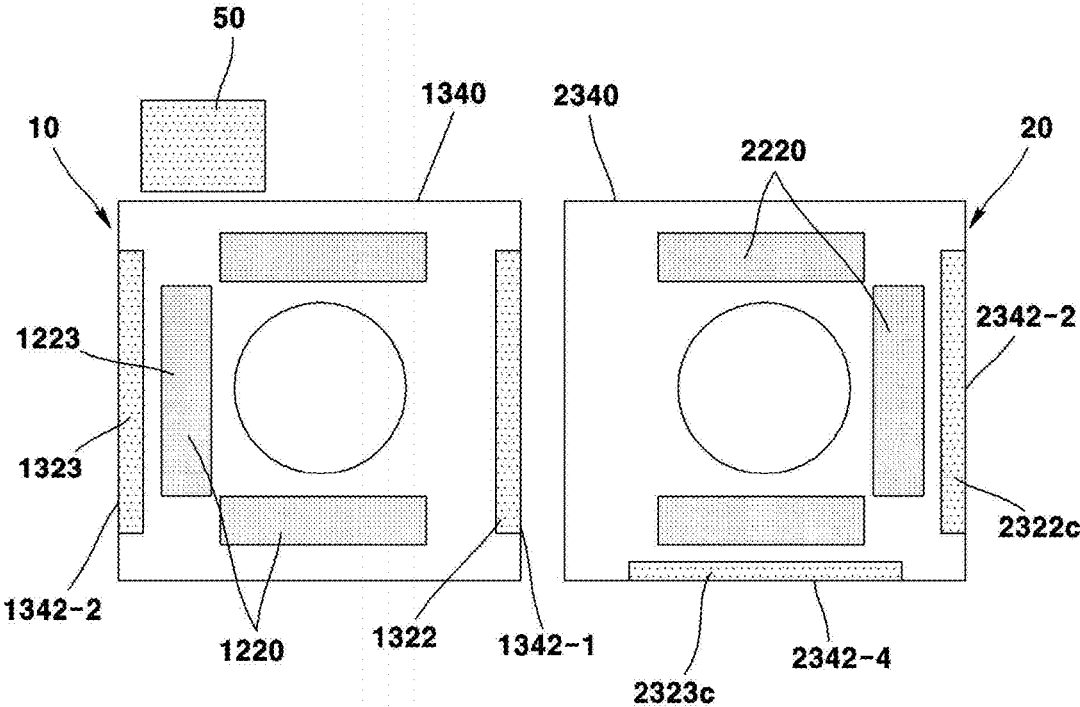


FIG. 37

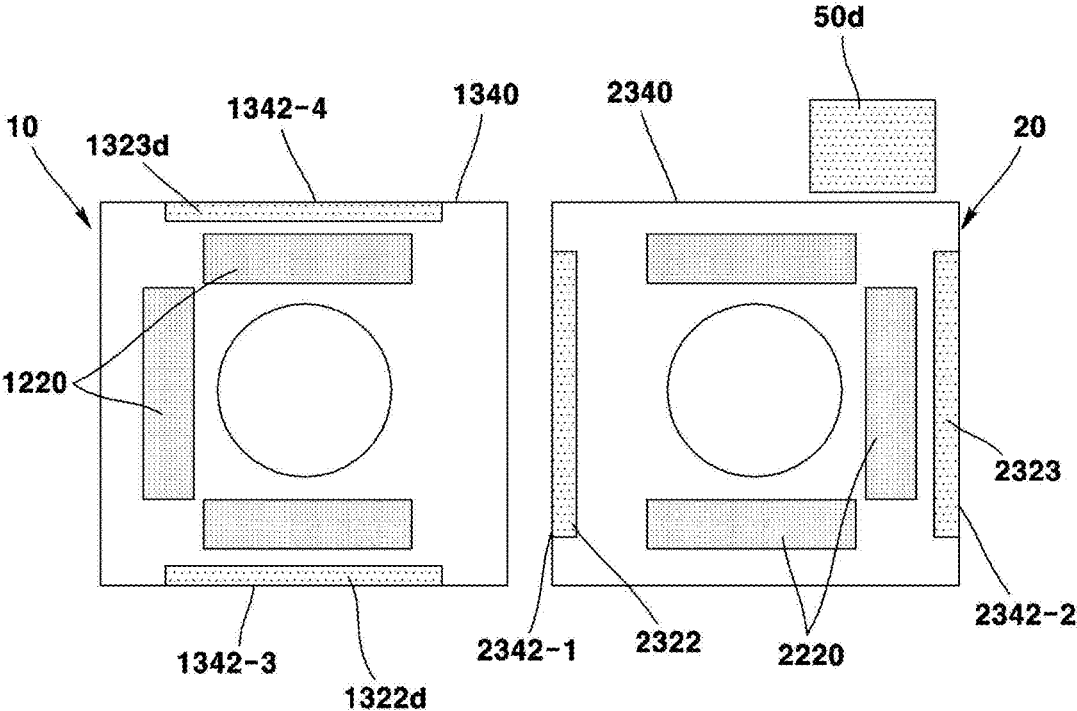


FIG. 38

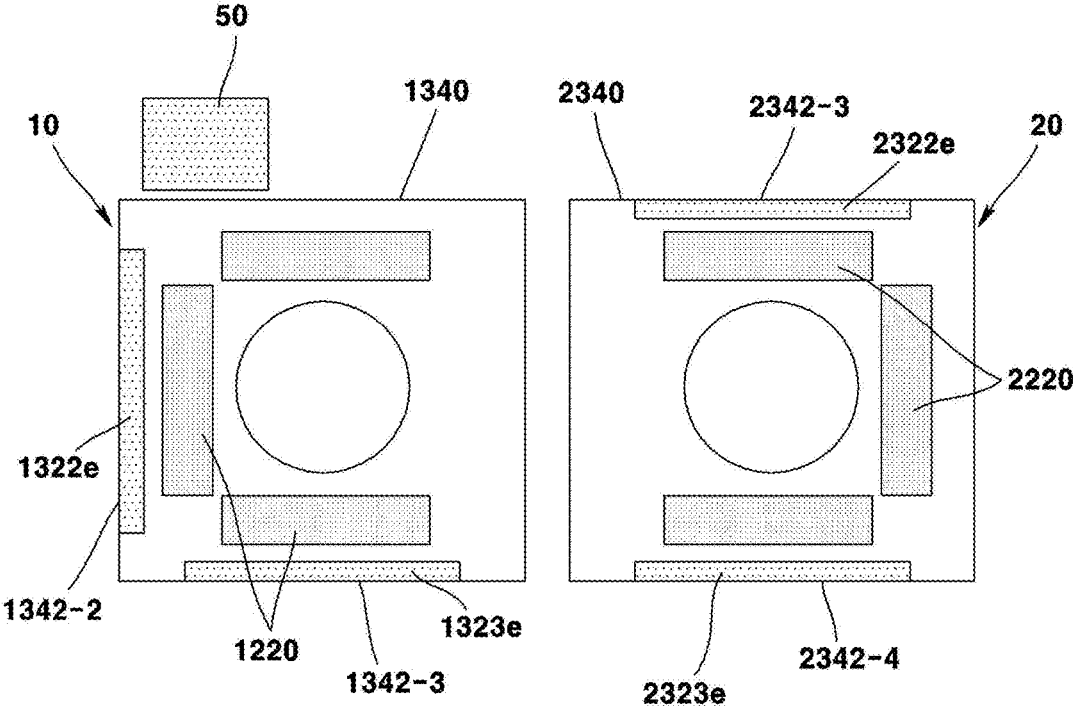


FIG. 39

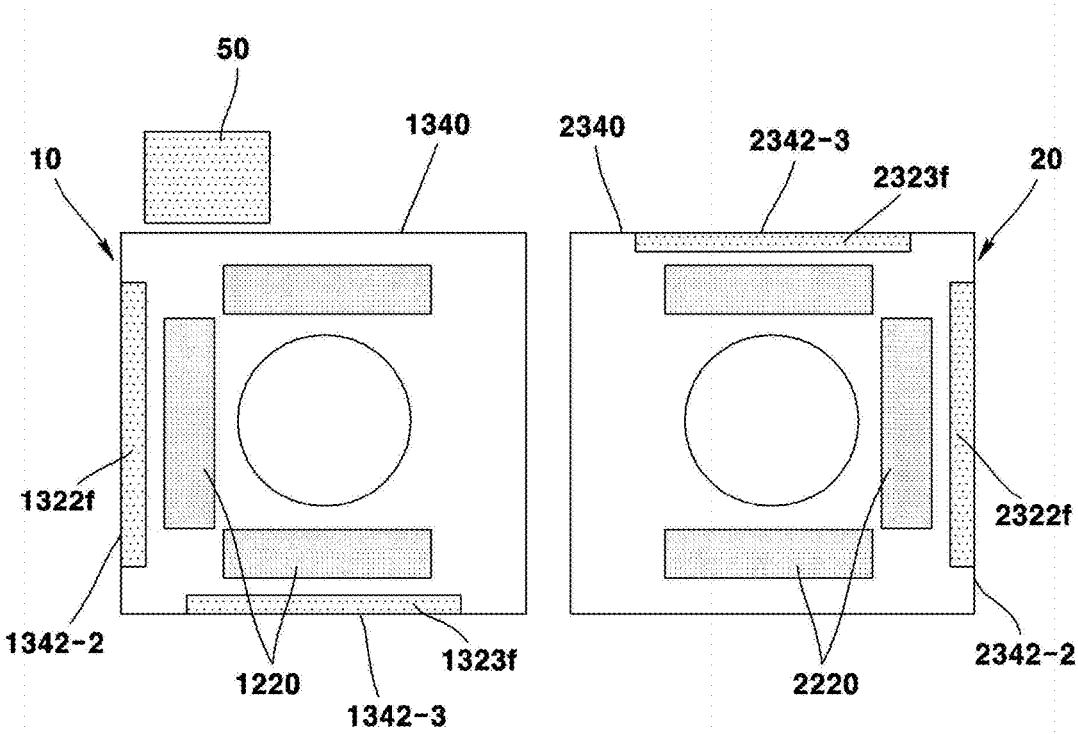


FIG. 40

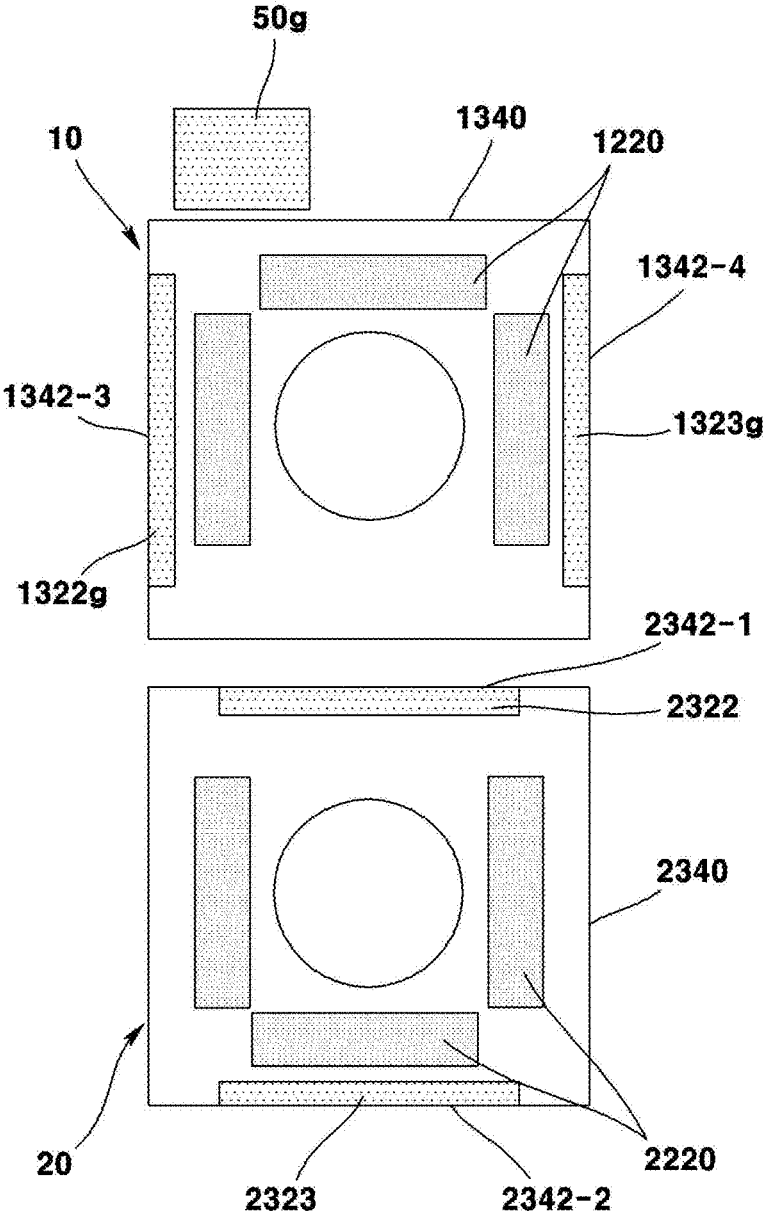


FIG. 41

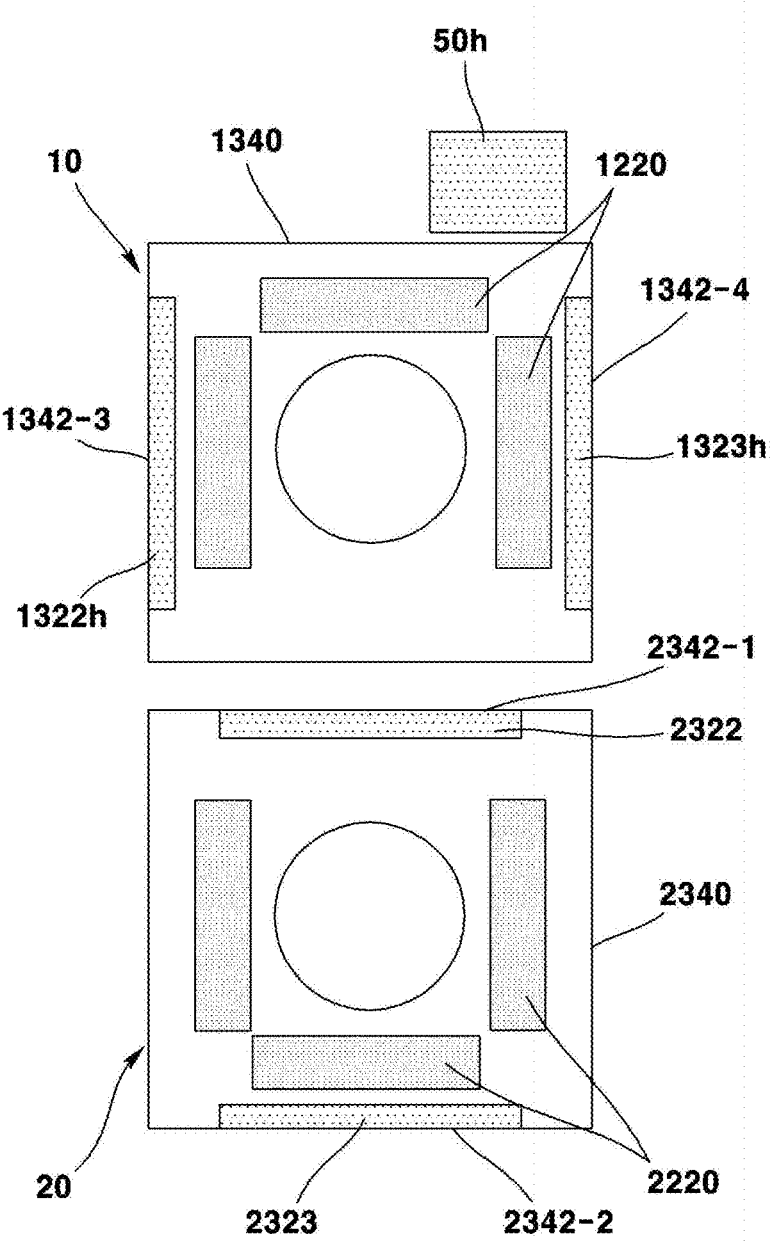


FIG. 42

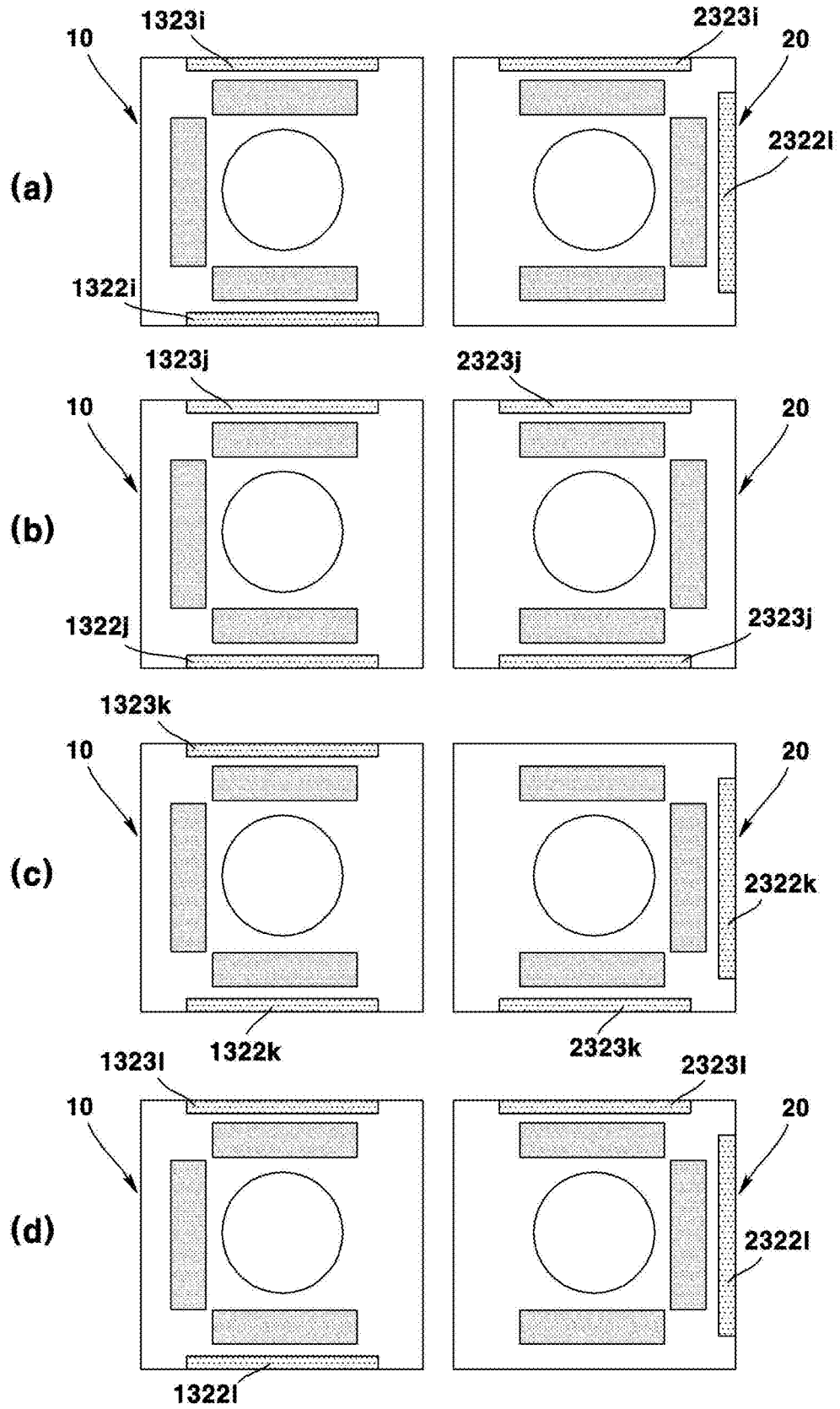


FIG. 43

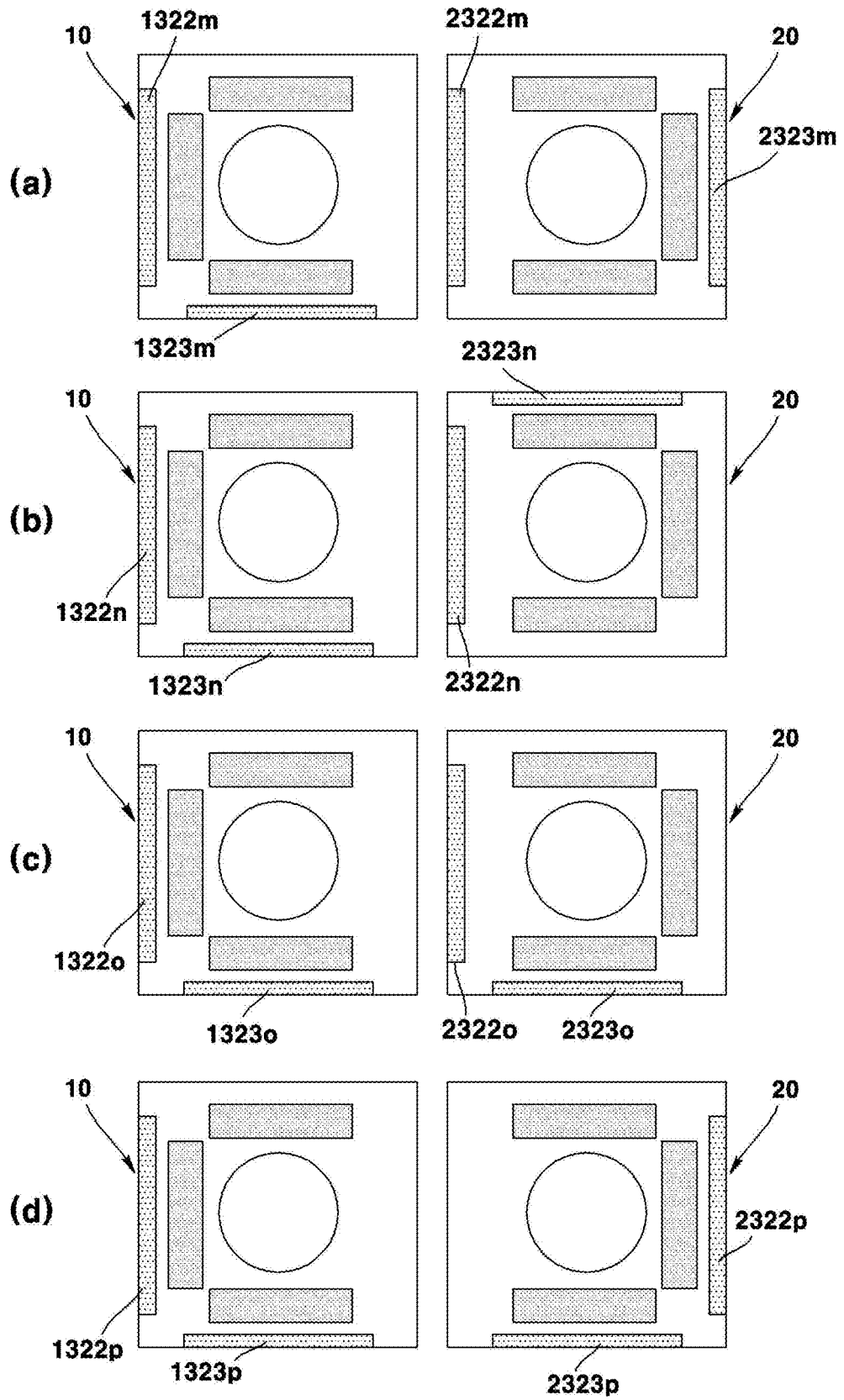


FIG. 44

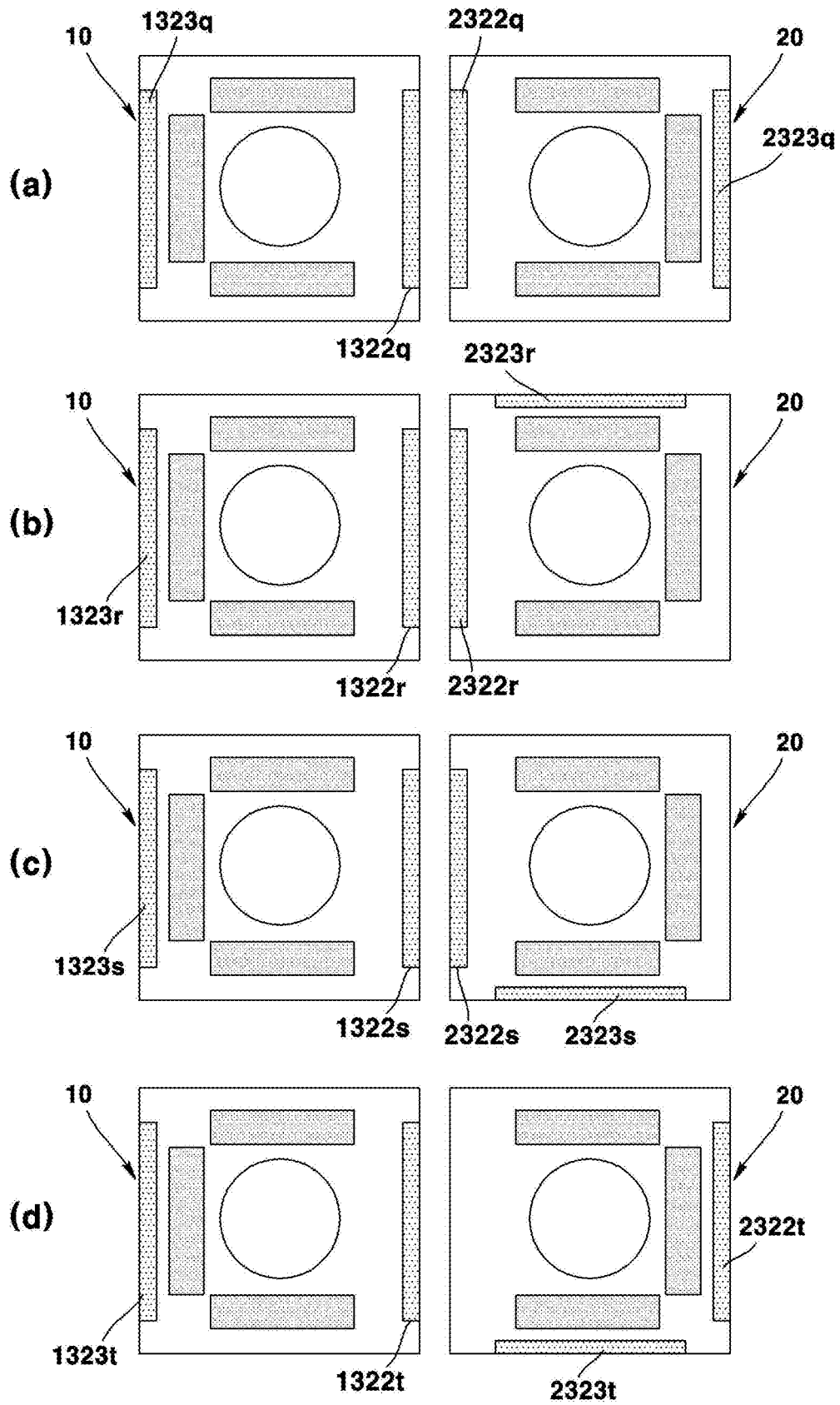
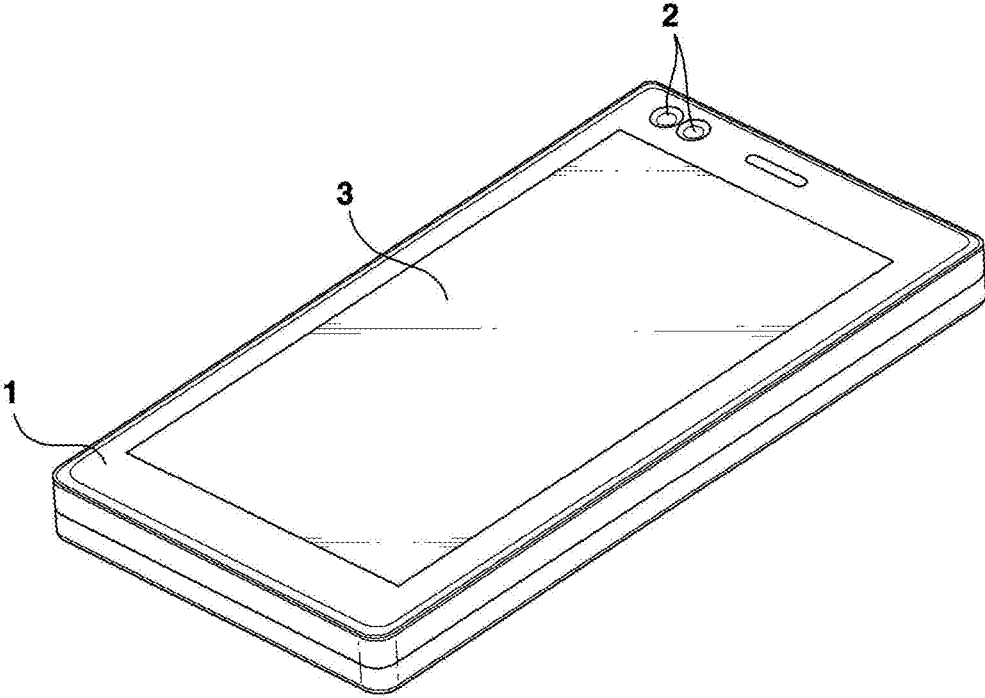


FIG. 45



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**CAMERA DEVICE COMPRISING A
STRUCTURE FOR DISPOSITION OF A
GYRO SENSOR**

CROSS-REFERENCE TO RELATED PATENT
APPLICATIONS

This application is a U.S. National Stage Application under 35 U.S.C. § 371 of PCT Application No. PCT/KR2021/011310, filed Aug. 24, 2021, which claims priority to Korean Patent Application No. 10-2020-0132516, filed Oct. 14, 2020 and 10-2021-0000157, filed Jan. 4, 2021, whose entire disclosures are hereby incorporated by reference.

TECHNICAL FIELD

The present embodiment relates to a camera device.

BACKGROUND ART

As the spread of various portable terminals is widely generalized and wireless Internet services are commercialized, the demands of consumers related to portable terminals are also diversifying, so that various types of additional devices are being installed in the portable terminals.

Among them, a typical example is a camera module that photographs a picture or video of a subject. Meanwhile, an auto focus function for automatically adjusting a focus according to a distance of a subject is applied to a recent camera module. In addition, a handshake correction function for compensating the user's handshake is also applied.

However, in the prior art, when the portion for soldering the terminal of the lens driving device on the printed circuit board and the gyro sensor are being disposed adjacent to each other, since the soldering work becomes difficult, as the gyro sensor is displaced to be spaced apart from the lens actuator, there is a problem in that the size of the printed circuit board increases.

DETAILED DESCRIPTION OF THE
INVENTION

Technical Subject

A first embodiment of the present embodiment is intended to provide a camera device securing a space for disposing a gyro sensor by driving a terminal at one side of a lens driving device to a corner at one side thereof.

A second embodiment of the present embodiment is intended to provide a camera device arranged so that the terminal of the lens driving device and the gyro sensor do not interfere.

Technical Solution

A camera device according to a first embodiment of present embodiment comprises: a printed circuit board; a gyro sensor being disposed on a first surface of the printed circuit board; and a first lens driving device being disposed on the first surface of the printed circuit board, wherein the first lens driving device comprises: a cover member comprising an upper plate and a lateral plate being extended from the upper plate; a bobbin being disposed inside the cover member; a magnet being disposed inside the cover member; a coil for moving the bobbin; and a substrate being electrically connected to the coil, wherein the lateral plate of

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the cover member comprises a first lateral plate and a second lateral plate being disposed at an opposite side to each other, and a third lateral plate and a fourth lateral plate being disposed at an opposite side to each other, wherein the gyro sensor is disposed closest to the first lateral plate among the first to fourth lateral plates, wherein the substrate comprises a first terminal unit and a plurality of terminals being disposed in the first terminal unit and electrically connected to the printed circuit board, and wherein the first terminal unit of the substrate may be disposed at a position corresponding to the first lateral plate of the cover member.

The first lens driving device may comprise a base being coupled to the lateral plate of the cover member and a housing being disposed between the bobbin and the cover member, wherein the substrate may be disposed in the base.

The first terminal unit may not be overlapped with the gyro sensor in a direction in which the second lateral plate faces the first lateral plate.

The substrate may comprise a second terminal unit being disposed at an opposite side of the first terminal unit, and the second terminal unit of the substrate may be disposed at a position corresponding to the second lateral plate of the cover member.

The length of the first terminal unit may be shorter than the length of the second terminal unit in a direction in which the third lateral plate faces the fourth lateral plate.

Seven or less terminals are disposed in the first terminal unit, and ten or more terminals may be disposed in the second terminal unit.

The first lateral plate of the cover member comprises a first region close to one corner among corners at both sides, and a second region close to the other corner among corners at both sides, wherein the first terminal unit is disposed in a position corresponding to the first region of the first lateral plate, and wherein the gyro sensor may be disposed at a position corresponding to the second region of the first lateral plate.

The first terminal unit of the substrate may be omitted at a position corresponding to the gyro sensor.

The gyro sensor may be spaced apart from the cover member, the base, and the substrate.

The first terminal unit of the substrate may be disposed closest to the first lateral plate among the first to fourth lateral plates.

The coil may comprise a first coil for moving the bobbin in an optical axis direction and a second coil for moving the bobbin in a direction perpendicular to the optical axis direction.

It comprises a second lens driving device being disposed on the first surface of the printed circuit board is comprised, wherein the second lens driving device may be disposed closest to the third lateral plate among the first to fourth lateral plates.

The first lens driving device comprises a dummy member being disposed at a position corresponding to the third lateral plate, wherein the magnet comprises a first magnet being disposed at a position corresponding to the first lateral plate, a second magnet being disposed at a position corresponding to the second lateral plate, and a third magnet being disposed at a position corresponding to the fourth lateral plate, and wherein the dummy member has a weight corresponding to that of the third magnet and may have a magnetic force weaker than or no magnetic force.

The first terminal unit may be disposed between the gyro sensor and the second lens driving device.

The printed circuit board comprises: a first portion on which the first lens driving device is disposed; a second

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portion on which a connector is disposed; and a third portion connecting the first portion and the second portion, wherein the third portion may be disposed closest to the second lateral plate among the first to fourth lateral plates.

The camera device may comprise: an image sensor being disposed on the printed circuit board; and a lens being coupled to the bobbin.

An optical device according to a first embodiment of present embodiment comprises: a main body; the camera device of claim 1 being disposed in the main body; and a display being disposed in the main body and outputting an image by the camera device.

The camera device according to the first embodiment of the present embodiment comprises: a printed circuit board; an image sensor being disposed in the printed circuit board; a gyro sensor being disposed on a first surface of the printed circuit board; a first lens driving device being disposed on the first surface of the printed circuit board; and a second lens driving device being disposed on the first surface of the printed circuit board, wherein the first lens driving device comprises: a cover member comprising an upper plate and a lateral plate being extended from the upper plate; a magnet being disposed inside the cover member; a coil being disposed inside the cover member; and a substrate being electrically connected to the coil, wherein the lateral plate of the cover member may comprise a first lateral plate and a second lateral plate being disposed at an opposite side to each other, and a third lateral plate and a fourth lateral plate being disposed at an opposite side to each other, wherein the second lens driving device is disposed closest to the third lateral plate among the first to fourth lateral plates, wherein the gyro sensor is disposed closest to the first lateral plate among the first to fourth lateral plates, and wherein the substrate may comprise a first terminal unit being disposed closest to the first lateral plate among the first to fourth lateral plates.

The lens driving device according to the first embodiment of the present embodiment comprises: a cover member comprising an upper plate and a lateral plate being extended from the upper plate; a magnet being disposed inside the cover member; a coil being disposed inside the cover member; and a substrate being electrically connected to the coil, wherein the lateral plate of the cover member comprises a first lateral plate and a second lateral plate being disposed at an opposite to each other, wherein the substrate comprises a first terminal unit being disposed at a position corresponding to the first lateral plate and a second terminal unit being disposed at a position corresponding to the second lateral plate, wherein the width of the first terminal unit in the first direction is smaller than the width of the second terminal unit in the first direction, and wherein the first terminal unit may be disposed closer to one corner of both sides of the first lateral plate.

The camera device according to the second embodiment of the present embodiment comprises: a printed circuit board; a first lens driving device being disposed on the printed circuit board; and a second lens driving device being disposed on the printed circuit board, wherein the first lens driving device comprises a first cover, a first base being coupled to the first cover, and a first substrate being disposed in the first base, wherein the second lens driving device comprises a second cover, wherein the first lateral plate of the first cover is disposed facing the first lateral plate of the second cover, wherein the first substrate comprises a terminal unit comprising a terminal being coupled to the printed circuit board, and wherein the terminal unit of the first

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substrate may comprise a first terminal unit being disposed at a position corresponding to the first lateral plate of the first cover.

An outer side surface of the first terminal unit may face the second lens driving device.

The first base may comprise a first side surface being disposed at a position corresponding to the first lateral plate of the first cover, wherein the first terminal unit may be disposed on the first side surface of the first base.

The terminal unit of the first substrate may comprise a second terminal unit being disposed at an opposite side of the first terminal unit.

The second lens driving device comprises a second base coupled to the second cover, and a second substrate disposed on the second base, wherein the second substrate may comprise a first terminal unit being disposed to face the first terminal unit of the first substrate.

The second substrate may comprise a second terminal unit being disposed at an opposite side of the first terminal unit of the second substrate.

The first cover comprises a second lateral plate being disposed at an opposite side of the first lateral plate, and a third lateral plate and a fourth lateral plate being disposed at an opposite side to each other, wherein a gyro sensor may be disposed adjacent to the third lateral plate of the first cover.

The second lens driving device comprises a second base being coupled to the second cover and a second substrate being disposed in the second base, wherein the second cover comprises a first lateral plate and a second lateral plate disposed at an opposite side to each other, and a third lateral plate and a fourth lateral plate being disposed at an opposite side to each other, and wherein the second substrate may comprise a first terminal unit being disposed at a position corresponding to the third lateral plate of the second cover.

The second substrate may comprise a second terminal unit being disposed at a position corresponding to the fourth lateral plate of the second cover.

The second substrate may comprise a second terminal unit being disposed at a position corresponding to the second lateral plate of the second cover.

The first cover comprises: a second lateral plate being disposed at an opposite side of the first lateral plate; and a third lateral plate and a fourth lateral plate being disposed at an opposite side to each other, wherein the second lens driving device comprises a second base being coupled to the second cover and a second substrate being disposed in the second base, wherein the second cover comprises a first lateral plate and a second lateral plate disposed at an opposite side to each other, and a third lateral plate and a fourth lateral plate being disposed at an opposite side to each other, wherein the second substrate comprises a first terminal unit being disposed at a position corresponding to the third lateral plate of the second cover and a second terminal unit being disposed at a position corresponding to the fourth lateral plate of the second cover, and wherein a gyro sensor may be disposed to be adjacent to the second lateral plate of the second cover.

The gyro sensor may be disposed closer to the third lateral plate than to the fourth lateral plate of the second cover.

The first lens driving device comprises: a first bobbin being disposed inside the first cover; a first housing being disposed between the first bobbin and the first cover; a first coil being disposed on the first bobbin; a first magnet being disposed in the first housing; a second coil being disposed in the first substrate, wherein the second lens driving device may comprise: a second base being coupled to the second cover; a second substrate being disposed in the second base;

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a second bobbin being disposed inside the second cover; a second housing being disposed between the second bobbin and the second cover; a third coil being disposed on the second bobbin; a second magnet being disposed in the second housing; and a fourth coil disposed on the second substrate.

The first magnet is not disposed between the first bobbin and the first lateral plate of the first cover, and the second magnet may not be disposed between the second bobbin and the first lateral plate of the second cover.

The optical device according to the second embodiment of the present embodiment may comprise: a main body; the camera device of claim 1 being disposed in the main body; and a display being disposed in the main body and outputting an image photographed through the camera device.

The camera device according to the second embodiment of the present embodiment comprises: a printed circuit board; a first lens driving device being disposed on the printed circuit board; and a second lens driving device being disposed on the printed circuit board, wherein the first lens driving device comprises: a first cover; a first base being coupled to the first cover; a first substrate being disposed in the first base, wherein the second lens driving device comprises: a second cover; a second base being coupled to the second cover; a second substrate being disposed in the second base, wherein each of the first cover and the second cover comprises: a first lateral plate and a second lateral plate being disposed at an opposite side to each other; a third lateral plate and a fourth lateral plate being disposed at an opposite side to each other, wherein the first lateral plate of the first cover is disposed to face the first lateral plate of the second cover, wherein each of the first substrate and the second substrate comprises a terminal unit comprising a terminal being coupled to the printed circuit board, wherein the terminal unit of the first substrate comprises: a first terminal unit being disposed at a position corresponding to the second lateral plate of the first cover; a second terminal unit being disposed at a position corresponding to the third lateral plate of the first cover, and wherein the terminal unit of the second substrate may comprise a first terminal unit being disposed at a position corresponding to the third lateral plate of the second cover.

The terminal unit of the second substrate may comprise a second terminal unit being disposed at a position corresponding to the fourth lateral plate of the second cover.

The terminal unit of the second substrate may comprise a second terminal unit being disposed at a position corresponding to the second lateral plate of the second cover.

The first lens driving device comprises: a first bobbin being disposed inside the first cover; a first housing being disposed between the first bobbin and the first cover; a first coil being disposed on the first bobbin; a first magnet being disposed in the first housing; and a second coil being disposed in the first substrate, wherein the first magnet may not be disposed between the first bobbin and the first lateral plate of the first cover.

A camera device according to a second embodiment of the present embodiment comprises: a printed circuit board; a first lens driving device being disposed on the printed circuit board; and a second lens driving device being disposed on the printed circuit board, wherein the first lens driving device comprises: a first cover; a first base being coupled to the first cover; a magnet being disposed inside the first cover; a first substrate being disposed in the first base; a coil being disposed in the first substrate and facing the magnet, wherein the first substrate comprises: a body part in which the coil is disposed; a terminal unit being extended from an

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edge of the body part and comprising a terminal being electrically connected to the printed circuit board, wherein the coil comprises first to third coils, wherein the body part of the first substrate comprises: a first region in which the first coil is disposed; a second region in which the second coil is disposed; a third region in which the third coil is disposed; and a fourth region in which the coil is not disposed, and wherein the terminal unit of the first substrate may comprise a first terminal unit being extended from an edge of the fourth region.

Advantageous Effects

Through the first embodiment of the present embodiment, the size of the printed circuit board can be reduced as the gyro sensor is disposed adjacent to the lens driving device. That is, the space for arranging a camera device inside a smartphone can be reduced.

Through the second embodiment of the present embodiment, workability can be improved when soldering the terminal of the lens driving device to a printed circuit board. Furthermore, since the lens driving device and the gyro sensor can be disposed adjacent to each other on the printed circuit board, the size of the printed circuit board can be reduced. That is, the space for arranging a camera device in a smartphone can be reduced.

BRIEF DESCRIPTION OF DRAWINGS

FIG. 1 is a schematic diagram of a camera device according to a first embodiment of the present embodiment.

FIG. 2 is a perspective view of a camera device according to a first embodiment of the present embodiment.

FIG. 3 is a perspective view of a part of a camera device according to a first embodiment of the present embodiment.

FIG. 4 is a cross-sectional view viewed from A-A in FIG. 2.

FIG. 5 is a cross-sectional view viewed from line B-B of FIG. 2.

FIG. 6 is a cross-sectional view viewed from C-C in FIG. 2.

FIG. 7 is a perspective view of a first lens driving device according to a first embodiment of the present embodiment.

FIG. 8 is a perspective view of a first lens driving device according to a first embodiment of the present embodiment viewed from a direction different from FIG. 7.

FIG. 9 is an exploded perspective view of a first lens driving device according to a first embodiment of the present embodiment.

FIG. 10 is an exploded perspective view of a first mover of a first lens driving device according to a first embodiment of the present embodiment.

FIG. 11 is an exploded perspective view of a second mover of a first lens driving device according to a first embodiment of the present embodiment.

FIG. 12 is an exploded perspective view of a stator of a first lens driving device according to a first embodiment of the present embodiment.

FIG. 13 is an exploded perspective view of an elastic member and a support member of a first lens driving device according to a first embodiment of the present embodiment.

FIG. 14 is a schematic diagram of a modification of a camera device according to a first embodiment of the present embodiment.

FIG. 15 is a perspective view of an optical device according to a first embodiment of the present embodiment.

FIG. 16 is a schematic diagram of a camera device according to a second embodiment of the present embodiment.

FIG. 17 is a perspective view of a camera device according to a second embodiment of the present embodiment.

FIG. 18 is a perspective view of a part of a camera device according to a second embodiment of the present embodiment.

FIG. 19 is a cross-sectional view viewed from A-A in FIG. 2.

FIG. 20 is a cross-sectional view viewed from line B-B in FIG. 2.

FIG. 21 is a cross-sectional view viewed from C-C in FIG. 2.

FIG. 22 is a perspective view of a first lens driving device according to a second embodiment of present embodiment.

FIG. 23 is an exploded perspective view of a first lens driving device according to a second embodiment of present embodiment.

FIG. 24 is an exploded perspective view of a first mover of a first lens driving device according to a second embodiment of present embodiment.

FIG. 25 is an exploded perspective view of a second mover of a first lens driving device according to a second embodiment of present embodiment.

FIG. 26 is an exploded perspective view of a stator of a first lens driving device according to a second embodiment of present embodiment.

FIG. 27 is an exploded perspective view of an elastic member and a support member of a first lens driving device according to a second embodiment of the present embodiment.

FIG. 28 is a perspective view of a second lens driving device according to a second embodiment of present embodiment.

FIG. 29 is an exploded perspective view of a second lens driving device according to a second embodiment of present embodiment.

FIG. 30 is an exploded perspective view of a first mover of a second lens driving device according to a second embodiment of present embodiment.

FIG. 31 is an exploded perspective view of a second mover of a second lens driving device according to a second embodiment of present embodiment.

FIG. 32 is an exploded perspective view of a stator of a second lens driving device according to a second embodiment of present embodiment.

FIG. 33 is an exploded perspective view of an elastic member and a support member of a second lens driving device according to a second embodiment of the present embodiment.

FIG. 34 is a schematic diagram of a camera device according to a first modified embodiment.

FIG. 35 is a schematic diagram of a camera device according to a second modified embodiment.

FIG. 36 is a schematic diagram of a camera device according to a third modified embodiment.

FIG. 37 is a schematic diagram of a camera device according to a fourth modified embodiment.

FIG. 38 is a schematic diagram of a camera device according to a fifth modified embodiment.

FIG. 39 is a schematic diagram of a camera device according to a sixth modified embodiment.

FIG. 40 is a schematic diagram of a camera device according to a seventh modified embodiment.

FIG. 41 is a schematic diagram of a camera device according to an eighth modified embodiment.

FIGS. 42 (a) to (d), 43 (a) to (d) and 44 (a) to (d) are schematic diagrams of camera devices according to other modified embodiments.

FIG. 45 is a perspective view of an optical device according to a second embodiment of the present embodiment.

BEST MODE

Hereinafter, preferred embodiments of the present invention will be described in detail with reference to the accompanying drawings.

However, the technical idea of the present invention is not limited to some embodiments to be described, but may be implemented in various forms, and inside the scope of the technical idea of the present invention, one or more of the constituent elements may be selectively combined or substituted between embodiments.

In addition, the terms (comprising technical and scientific terms) used in the embodiments of the present invention, unless explicitly defined and described, can be interpreted as a meaning that can be generally understood by a person skilled in the art, and commonly used terms such as terms defined in the dictionary may be interpreted in consideration of the meaning of the context of the related technology.

In addition, terms used in the present specification are for describing embodiments and are not intended to limit the present invention.

In the present specification, the singular form may comprise the plural form unless specifically stated in the phrase, and when described as "at least one (or more than one) of A and B and C", it may comprise one or more of all combinations that can be combined with A, B, and C.

In addition, in describing the components of the embodiment of the present invention, terms such as first, second, A, B, (a), and (b) may be used. These terms are merely intended to distinguish the components from other components, and the terms do not limit the nature, order or sequence of the components.

And, when a component is described as being 'connected', 'coupled' or 'interconnected' to another component, the component is not only directly connected, coupled or interconnected to the other component, but may also comprise cases of being 'connected', 'coupled', or 'interconnected' due that another component between that other components.

In addition, when described as being formed or arranged in "on (above)" or "below (under)" of each component, "on (above)" or "below (under)" means that it comprises not only the case where the two components are directly in contact with, but also the case where one or more other components are formed or arranged between the two components. In addition, when expressed as "on (above)" or "below (under)", the meaning of not only an upward direction but also a downward direction based on one component may be comprised.

An 'optical axis direction' used hereinafter is defined as an optical axis direction of a lens and/or an image sensor being coupled to a lens driving device.

The 'vertical direction' used hereinafter may be a direction parallel to the optical axis direction. The vertical direction may correspond to the 'z-axis direction'. The 'horizontal direction' used hereinafter may be a direction perpendicular to the vertical direction. That is, the horizontal direction may be a direction perpendicular to the optical axis. Accordingly, the horizontal direction may comprise an 'x-axis direction' and a 'y-axis direction'.

The 'auto focus (AF) function' used hereinafter is defined as a function that automatically focuses on a subject by adjusting the distance to the image sensor by moving the lens in an optical axis direction according to the distance of the subject so that a clear image of the subject can be obtained on the image sensor. In addition, 'closed-loop auto focus (CLAF) control' is defined as real-time feedback control of the position of the lens by detecting the distance between the image sensor and the lens to improve the accuracy of focusing.

The 'optical image stabilization (OIS) function' used hereinafter is defined as a function of offsetting the shaking by moving the lens in an opposite direction to the movement of the portable terminal detected by the gyro sensor. When the handshake correction function is driven, the lens may be moved or tilted in a direction perpendicular to the optical axis direction.

Hereinafter, a configuration of the camera device according to a first embodiment of the present embodiment will be described with reference to the drawings.

FIG. 1 is a schematic diagram of a camera device according to a first embodiment of the present embodiment; FIG. 2 is a perspective view of a camera device according to a first embodiment of the present embodiment; FIG. 3 is a perspective view of a part of a camera device according to a first embodiment of the present embodiment; FIG. 4 is a cross-sectional view viewed from A-A in FIG. 2; FIG. 5 is a cross-sectional view viewed from line B-B of FIG. 2; FIG. 6 is a cross-sectional view viewed from C-C in FIG. 2; FIG. 7 is a perspective view of a first lens driving device according to a first embodiment of the present embodiment; FIG. 8 is a perspective view of a first lens driving device according to a first embodiment of the present embodiment viewed from a direction different from FIG. 7; FIG. 9 is an exploded perspective view of a first lens driving device according to a first embodiment of the present embodiment; FIG. 10 is an exploded perspective view of a first mover of a first lens driving device according to a first embodiment of the present embodiment; FIG. 11 is an exploded perspective view of a second mover of a first lens driving device according to a first embodiment of the present embodiment; FIG. 12 is an exploded perspective view of a stator of a first lens driving device according to a first embodiment of the present embodiment; FIG. 13 is an exploded perspective view of an elastic member and a support member of a first lens driving device according to a first embodiment of the present embodiment; and FIG. 14 is a schematic diagram of a modification of a camera device according to a first embodiment of the present embodiment.

The camera device 3002 may comprise a camera module.

The camera device 3002 may comprise a lens driving device. The camera device 3002 may comprise a plurality of lens driving devices. The camera device 3002 may comprise two lens driving devices. The camera device 3002 may comprise first and second lens driving devices 3010 and 3020.

The camera device 3002 may comprise a printed circuit board (PCB) 3030. The printed circuit board 3030 may be a substrate or circuit substrate. A lens driving device may be disposed on the printed circuit board 3030. A first and second lens driving devices 3010 and 3020 may be disposed on the printed circuit board 3030. A sensor base may be disposed between the printed circuit board 3030 and the lens driving device 3010. The printed circuit board 3030 may be electrically connected to the lens driving device. The printed circuit board 3030 may be electrically connected to the first and second lens driving devices 3010 and 3020. An image

sensor may be disposed in the printed circuit board 3030. A gyro sensor 3050 may be disposed in the printed circuit board 3030. The printed circuit board 3030 may comprise various circuits, elements, controllers, and the like in order to convert an image formed in the image sensor into an electrical signal and transmit it to an external device.

The printed circuit board 3030 may comprise: a first portion 3021 in which the first lens driving device 3010 is disposed; a second portion 3022 in which a connector is disposed; and a third portion 3023 connecting the first portion 3021 and the second portion 3022. At this time, the third portion 3023 may be disposed closest to the second lateral plate 3342-2 among the first to fourth lateral plates 3342-1, 3342-2, 3342-3, and 3342-4 of the cover member 3340 of the first lens driving device 3010.

The camera device 3002 may comprise a lens module. The lens module may be coupled to the bobbin of the lens driving device. The lens module may be coupled to the bobbin by screw-coupling and/or an adhesive. The lens module may move integrally with the bobbin. The lens module may comprise a lens. The lens module may comprise a barrel and a plurality of lenses being disposed inside the barrel. The lens may be disposed at a position corresponding to the image sensor. The lens may comprise a first lens 3041 being coupled to the first lens driving device 3010. The lens may comprise a second lens 3042 being coupled to a second lens driving device 3020.

The camera device 3002 may comprise a filter. The filter may serve to block light of a specific frequency band among the light passing through the lens module from being incident on the image sensor. The filter may be disposed parallel to an x-y plane. The filter may be disposed between the lens module and the image sensor. A filter may be disposed in the sensor base. The filter may comprise an infrared filter. The infrared filter may block light in the infrared region from being incident on the image sensor. The infrared filter may comprise an infrared reflection filter or an infrared absorption filter.

The camera device 3002 may comprise a sensor base. The sensor base may be disposed between the lens driving device and the printed circuit board 3030. An opening may be formed in a portion of the sensor base where the filter is disposed so that light passing through the filter may be incident on the image sensor.

The camera device 3002 may comprise an image sensor. The image sensor may be configured to form an image by incident light passing through a lens and a filter. The image sensor may be disposed on the printed circuit board 3030. The image sensor may be mounted on the printed circuit board 3030. The image sensor may be electrically connected to the printed circuit board 3030. As an example, the image sensor may be coupled to the printed circuit board 3030 by a surface mounting technology (SMT). As another example, the image sensor may be coupled to the printed circuit board 3030 by a flip chip technology. The image sensor may be disposed such that an optical axis coincides with a lens. That is, the optical axis of the image sensor and the optical axis of the lens may be aligned. The image sensor may convert light irradiated onto an effective image area of the image sensor into an electrical signal. The image sensor may be any one of a charge coupled device (CCD), a metal oxide semi-conductor (MOS), a CPD, and a CID.

The camera device 3002 may comprise a gyro sensor 3050. The gyro sensor 3050 may be disposed in the printed circuit board 3030. The gyro sensor 3050 may be disposed on an upper surface of the printed circuit board 3030. The gyro sensor 3050 may be disposed on a first surface of the

printed circuit board **3030**. The gyro sensor **3050** may be spaced apart from the cover member **3340**, the base **3310** and the substrate **3320**. The gyro sensor **3050** may be spaced apart from the first terminal unit **3322** of the substrate **3320**. In a modified embodiment, the gyro sensor **3050** may be disposed to be in contact with the base **3310**. The gyro sensor **3050** may be disposed closest to the first lateral plate **3342-1** among the first to fourth lateral plates **3342-1**, **3342-2**, **3342-3**, and **3342-4** of the cover member **3340**. The gyro sensor **3050** may output rotational angular velocity information due to the movement of the camera device **3002**. The gyro sensor **3050** may comprise a 2-axis or 3-axis gyro sensor.

As illustrated in FIG. 1, the gyro sensor **3050** may be disposed closer to the second lens driving device **3020** than to the first terminal unit **3322**. However, in a modified embodiment, the gyro sensor **350a** may be disposed farther from the second lens driving device **3020** than the first terminal unit **3322a**, as illustrated in FIG. 14. That is, the first terminal unit **3322a** may be disposed closer to the second lens driving device **3020** than the gyro sensor **350a**.

The camera device **3002** may comprise a connector. The connector may be electrically connected to the printed circuit board **3030**. The connector may comprise a port for electrically connecting with an external device. The connector may be disposed in the third portion **333** of the printed circuit board **3030**.

The camera device **3002** may comprise a first lens driving device **3010**. The first lens driving device **3010** may be a voice coil motor (VCM). The first lens driving device **3010** may be a lens driving motor. The first lens driving device **3010** may be a lens driving actuator. The first lens driving device **3010** may comprise an AF module. The first lens driving device **3010** may comprise an OIS module. The first lens driving device **3010** may be disposed on a first surface of the printed circuit board **3030**.

The first lens driving device **3010** may comprise a first mover **3100**. The first mover **3100** may be coupled to the first lens **3041**. The first mover **3100** may be connected to the second mover **3200** through a first elastic member **3410** and/or a second elastic member **3420**. The first mover **3100** may move through interaction with the second mover **3200**. At this time, the first mover **3100** may move integrally with the first lens **3041**. Meanwhile, the first mover **3100** may move during AF driving. At this time, the first mover **3100** may be referred to as an 'AF mover'. However, the first mover **3100** may move together with the second mover **3200** even during OIS driving.

The first lens driving device **3010** may comprise a bobbin **3110**. The first mover **3100** may comprise a bobbin **3110**. The bobbin **3110** may be disposed inside the housing **3210**. The bobbin **3110** may be disposed in a hole **3211** of the housing **3210**. The bobbin **3110** may be movably coupled to the housing **3210**. The bobbin **3110** may move against the housing **3210** in an optical axis direction. A first lens **3041** may be coupled to the bobbin **3110**. The bobbin **3110** and the first lens **3041** may be coupled by screw-coupling and/or adhesive. A first coil **3120** may be coupled to the bobbin **3110**. A first elastic member **3410** may be coupled to an upper portion or an upper surface of the bobbin **3110**. A second elastic member **3420** may be coupled to a lower portion or a lower surface of the bobbin **3110**. The bobbin **3110** may be coupled to the first elastic member **3410** and/or the second elastic member **3420** by thermal fusion and/or an adhesive. An adhesive coupling the bobbin **3110** and the first lens **3041** and the bobbin **3110** and the elastic member **3400**

may be an epoxy being cured by at least one among ultraviolet (UV) light, heat, and laser.

The bobbin **3110** may comprise a hole **3111**. The hole **3111** may be hollow. The hole **3111** may penetrate through the bobbin **3110** in an optical axis direction. The first lens **3041** may be accommodated in the hole **3111**. For an example, a screw thread corresponding to a screw thread being formed on an outer circumferential surface of the first lens **3041** may be disposed on an inner circumferential surface of the hole **3111** of the bobbin **3110**.

The bobbin **3110** may comprise a groove **3112**. The groove **3112** may be a sensing magnet accommodating groove. The groove **3112** may be a recess. A sensing magnet **3130** may be disposed in the groove **3112**. The groove **3112** of the bobbin **3110** may be formed on an outer circumferential surface of the bobbin **3110**. At least a portion of the groove **3112** of the bobbin **3110** may be formed to correspond to the shape and size of the sensing magnet **3130**. The groove **3112** may be opened toward lower direction.

The bobbin **3110** may comprise a protrusion **3113**. A first coil **3120** may be disposed in the protrusion **3113**. The protrusion **3113** may be formed on an outer circumferential surface of the bobbin **3110**. The protrusion **3113** may be protruded from an outer circumferential surface of the bobbin **3110**. The first coil **3120** may be wound and fixed to the protrusion **3113**.

The bobbin **3110** may comprise a lower stopper **3114**. A lower stroke of the bobbin **3110** may be restricted through the lower stopper **3114**. The lower stopper **3114** may be formed on an outer circumferential surface of the bobbin **3110**. The lower stopper **3114** may come into contact with the housing **3210** when the bobbin **3110** moves downward.

The first lens driving device **3010** may comprise a first coil **3120**. The first mover **3100** may comprise a first coil **3120**. The first coil **3120** may be an 'AF driving coil' used for AF driving. The first coil **3120** may be disposed in the bobbin **3110**. The first coil **3120** may move the bobbin **3110**. The first coil **3120** may be disposed between the bobbin **3110** and the housing **3210**. The first coil **3120** may be disposed on an outer side surface or an outer circumferential surface of the bobbin **3110**. The first coil **3120** may be directly wound around the bobbin **3110**. Or, the first coil **3120** may be coupled to the bobbin **3110** in a state being directly wound. The first coil **3120** may face the magnet **3220**. The first coil **3120** may be disposed to face the magnet **3220**. The first coil **3120** may interact with the magnet **3220** electromagnetically. In this case, when a current is supplied to the first coil **3120** and an electromagnetic field is formed around the first coil **3120**, the first coil **3120** can move against the magnet **3220** due to the electromagnetic interaction between the first coil **3120** and the magnet **3220**.

The first coil **3120** may comprise a plurality of coils. The first coil **3120** may comprise two coils. The first coil **3120** may comprise first-first and first-second coils **3121** and **3122**. The first-first coil **3121** may be disposed at a position corresponding to the first lateral plate **3342-1** of the cover member **3340**. The first-first coil **3121** may be disposed to face the first lateral plate **3342-1** of the cover member **3340**. The first-second coil **3122** may be disposed at a position corresponding to the second lateral plate **3342-2** of the cover member **3340**. The first-second coil **3122** may be disposed to face the second lateral plate **3342-2** of the cover member **3340**.

In a first embodiment of the present embodiment, the first coil **3120** and the magnet **3220** may move the bobbin **3110** against the housing **3210** in an optical axis direction. The first coil **3120** and the magnet **3220** may move the bobbin

3110 in an optical axis direction through electromagnetic interaction. The first coil **3120** and the magnet **3220** may be used for AF driving.

The first lens driving device **3010** may comprise a coil. The coil may move the bobbin **3110**. The coil may comprise a first coil **3120** that moves the bobbin **3110** in an optical axis direction and a second coil **3330** that moves the bobbin **3110** in a direction perpendicular to the optical axis direction.

The first lens driving device **3010** may comprise a sensing magnet **3130**. The first mover **3100** may comprise a sensing magnet **3130**. The sensing magnet **3130** may be disposed in the bobbin **3110**. The sensing magnet **3130** may be detected through the first sensor **3610**. In addition, the first lens driving device **3010** may comprise a compensation magnet. The first mover **3100** may comprise a compensation magnet. The compensation magnet may be disposed to balance the magnetic force with the sensing magnet **3130**. The compensation magnet may have a weight corresponding to that of the sensing magnet **3130**. The compensation magnet may be disposed symmetrically with the sensing magnet **3130** with respect to an optical axis.

The first lens driving device **3010** may comprise a second mover **3200**. The second mover **3200** may be movably coupled to the stator **3300** through a support member **3500**. The second mover **3200** may support the first mover **3100** through the first and second elastic members **3410** and **3420**. The second mover **3200** may move the first mover **3100** or may move together with the first mover **3100**. The second mover **3200** may move through interaction with the stator **3300**. The second mover **3200** may move during OIS driving. At this time, the second mover **3200** may be referred to as an 'OIS mover'. The second mover **3200** may move integrally with the first mover **3100** during OIS driving.

The first lens driving device **3010** may comprise a housing **3210**. The second mover **3200** may comprise a housing **3210**. The housing **3210** may be spaced apart from the base **3310**. The housing **3210** may be disposed outside the bobbin **3110**. The housing **3210** may accommodate at least a portion of the bobbin **3110**. The housing **3210** may be disposed inside the cover member **3340**. The housing **3210** may be disposed between the cover member **3340** and the bobbin **3110**. The housing **3210** may be formed of a material different from that of the cover member **3340**. The housing **3210** may be formed of an insulating material. The housing **3210** may be formed of an injection molding material. An outer side surface of the housing **3210** may be spaced apart from an inner surface of the lateral plate **3342** of the cover member **3340**. Through the separation space between the housing **3210** and the cover member **3340**, the housing **3210** may move for OIS driving. A magnet **3220** may be disposed in the housing **3210**. The housing **3210** and the magnet **3220** may be coupled by an adhesive. A first elastic member **3410** may be coupled to an upper portion or an upper surface of the housing **3210**. A second elastic member **3420** may be coupled to a lower portion or a lower surface of the housing **3210**. The housing **3210** may be coupled to an upper portion and second elastic members **3410** and **3420** by thermal fusion and/or an adhesive. The adhesive for coupling the housing **3210** and the magnet **3220** and the housing **3210** and the elastic member **3400** may be an epoxy cured by at least one among ultraviolet (UV) light, heat, and laser.

The housing **3210** may comprise four side portions and four corner portions being disposed between the four side portions. The side portion of the housing **3210** may comprise: a first side portion; a second side portion being disposed at an opposite side of the first side portion; a third side portion and a fourth side portion being disposed at an

opposite side to each other between the first side portion and the second side portion. The corner portion of the housing **3210** may comprise: a first corner portion being disposed between the first side portion and the third side portion; a second corner portion being disposed between the first side portion and the fourth side portion; a third corner portion being disposed between the second side portion and the third side portion; and a fourth corner portion being disposed between the second side portion and the fourth side portion. A side portion of the housing **3210** may comprise a 'lateral wall'. The first side portion of the housing **3210** may be disposed at a position corresponding to the first lateral plate **3342-1** of the cover member **3340**. The second side portion of the housing **3210** may be disposed at a position corresponding to the second lateral plate **3342-2** of the cover member **3340**. The third side portion of the housing **3210** may be disposed at a position corresponding to a third lateral plate **3342-3** of the cover member **3340**. The fourth side portion of the housing **3210** may be disposed at a position corresponding to a fourth lateral plate **3342-4** of the cover member **3340**.

The housing **3210** may comprise a hole **3211**. The hole **3211** may be hollow. The hole **3211** may be formed in the housing **3210**. The hole **3211** may be formed to penetrate through the housing **3210** in an optical axis direction. A bobbin **3110** may be disposed in the hole **3211**. At least a portion of the hole **3211** may be formed in a shape corresponding to that of the bobbin **3110**. An inner circumferential surface or an inner circumferential surface of the housing **3210** forming the hole **3211** may be spaced apart from an outer circumferential surface of the bobbin **3110**. However, the housing **3210** and the bobbin **3110** may be at least partially overlapped in an optical axis direction, thereby restricting the distance of the moving stroke of the bobbin **3110** in an optical axis direction.

The housing **3210** may comprise a groove **3212**. The groove **3212** may accommodate at least a portion of the lower stopper **3114** of the bobbin **3110**. The bottom surface of the groove **3212** may be overlapped with the lower stopper **3114** of the bobbin **3110** in an optical axis direction. When the bobbin **3110** moves downward, the lower stopper **3114** of the bobbin **3110** may be in contact with the bottom surface of the groove **3212** of the housing **3210**.

The housing **3210** may comprise a hole **3213**. The hole **3213** may be a magnet accommodating groove. A magnet **3220** may be coupled to the groove **3213**. The groove **3213** may be formed as a portion of an inner circumferential surface and/or a lower surface of the housing **3210** is being recessed. The groove **3213** may be formed in each of the three side portions of the housing **3210**. The groove **3213** may be formed in first, second and fourth side portions of the housing **3210**. The groove **3213** may be formed in a shape corresponding to the third side portion of the housing **3210**, but a dummy member **3230**, instead of the magnet **3220**, may be disposed in the groove **3213** being formed in a third side portion of the housing **3210**.

The housing **3210** may comprise a hole **3214**. The hole **3214** may be a hole through which a support member passes. The hole **3214** may be formed in a corner portion of the housing **3210**. The hole **3214** may be formed to penetrate through the housing **3210** in an optical axis direction. A support member **3500** may be disposed in the hole **3214** of the housing **3210**. The support member **3500** may pass through the hole **3214** of the housing **3210**.

The first lens driving device **3010** may comprise a magnet **3220**. The second mover **3200** may comprise a magnet **3220**. The magnet **3220** may be disposed in the housing **3210**. The

magnet **3220** may be disposed inside the cover member **3340**. The magnet **3220** may be fixed to the housing **3210** by an adhesive. The magnet **3220** may be disposed between the bobbin **3110** and the housing **3210**. The magnet **3220** may face the first coil **3120**. The magnet **3220** may interact with the first coil **3120** electromagnetically. The magnet **3220** may move the bobbin **3110** in an optical axis direction through interaction with the first coil **3120**. The magnet **3220** may be used for AF driving. The magnet **3220** may face the second coil **3330**. The magnet **3220** may interact with the second coil **3330** electromagnetically. The magnet **3220** may move the bobbin **3110** and the housing **3210** in a direction perpendicular to the optical axis direction through interaction with the second coil **3330**. The magnet **3220** may be used for OIS driving. The magnet **3220** may be disposed in a plurality of side portions of the housing **3210**. The magnet **3220** may be a flat magnet having a flat plate shape.

The magnet **3220** may comprise a plurality of magnets. The magnet **3220** may comprise three magnets. The magnet **3220** may comprise first to third magnets **3221**, **3222**, and **3223**. The first magnet **3221** may be disposed in a first side portion of the housing **3210**. The second magnet **3221** may be disposed in a second side portion of the housing **3210**. The third magnet **3221** may be disposed in a fourth side portion of the housing **3210**. A dummy member **3230** may be disposed in a third side portion of the housing **3210**.

The first magnet **3221** may face the first-first coil **3121**. The second magnet **3222** may face the first-second coil **3122**. The first and second magnets **3221** and **3222** may be used during AF driving. The magnet **3220** may comprise: a first magnet **3221** being disposed at a position corresponding to the first lateral plate **3342-1** of the cover member **3340**; a second magnet **3222** being disposed at a position corresponding to the second lateral plate **3342-2**; and a third magnet **3223** being disposed at a position corresponding to the fourth lateral plate **3342-4**.

The first magnet **3221** may face the second-first coil **3331**. The second magnet **3222** may face the second-second coil **3332**. The first and second magnets **3221** and **3222** may be used when driving in an OIS-x axis direction. The third magnet **3223** may face the second-third coil **3333**. The third magnet **3223** may be used when driving in an OIS-y axis direction. The area of a lower surface of the third magnet **3223** may be larger than that of each of the lower surfaces of the first magnet **3221** and the second magnet **3222**.

The first magnet **3221** and the second magnet **3222** may be 4-pole magnetized magnets. The first magnet **3221** and the second magnet **3222** may be 4-pole magnets. The 4-pole magnetized magnet may comprise a neutral portion being disposed in a horizontal direction at the central portion. Here, the neutral portion may be a void. The first magnet **3221** and the second magnet **3222** may be both-pole magnetized. As the first magnet **3221** and the second magnet **3222** are both-pole magnetized, the AF electromagnetic force can be maximized. Each of the first magnet **3221** and the second magnet **3222** may be a 4-pole magnet in which an upper portion of the inner surface has a different polarity than a lower portion of the inner surface and an upper portion of the outer surface, and the same polarity as a lower portion of the outer surface.

The third magnet **3223** may be a two-pole magnetized magnet. The third magnet **3223** may be a two-pole magnet. The third magnet **3223** may be a two-pole magnet having different inner and outer polarities. For example, an inner surface of the third magnet **3223** may have an N pole and an outer surface of the third magnet **3223** may have an S pole. Conversely, an inner surface of the third magnet **3223** may

be an S pole and an outer surface of the third magnet **3223** may be an N pole. However, as a modified embodiment, the third magnet **3223** may be a 4-pole magnet. The third magnet **3223** may be larger than each of the first magnet **3221** and the second magnet **3222**.

The first lens driving device **3010** may comprise a dummy member **3230**. The second mover **3200** may comprise a dummy member **3230**. The dummy member **3230** may be disposed in the housing **3210**. The dummy member **3230** may be disposed in the third side portion of the housing **3210**. The dummy member **3230** may be disposed adjacent to the second lens driving device **3020**. Through this, magnetic force interference between the first lens driving device **3010** and the second lens driving device **3020** can be minimized. The dummy member **3230** may be disposed at a position corresponding to the third lateral plate **3342-3** of the cover member **3340**.

The dummy member **3230** may have a weight corresponding to that of the third magnet **3223**. The dummy member **3230** may have a weaker magnetic force than the third magnet **3223** or may not have magnetic force. The dummy member **3230** may be disposed at an opposite side of the third magnet **3223** in the housing **3210**. The weight of the dummy member **3230** may correspond to the weight of the third magnet **3223**. However, the dummy member **3230** may have a weight lighter than the weight of the third magnet **3223**. Or, the dummy member **3230** may have a weight heavier than the weight of the third magnet **3223**. The dummy member **3230** may be inside 80% of the weight of the third magnet **3223** to 120% of the weight of the third magnet **3223**. If the weight of the dummy member **3230** is less than the lower limit or exceeds the upper limit of the above-mentioned values, the weight balancing of the OIS driving unit may collapse.

The dummy member **3230** may be a non-magnetic material. The dummy member **3230** may comprise a non-magnetic material. The magnetic strength of the dummy member **3230** may be weaker than the magnetic strength of the third magnet **3223**. The dummy member **3230** may be disposed at an opposite side of the third magnet **3223** to align the center of gravity. The dummy member **3230** may be made from a material of 95% or more of tungsten. That is, the dummy member **3230** may be a tungsten alloy. For an example, the specific gravity of the dummy member **3230** may be 18000 or more. The dummy member **3230** may be disposed symmetrically with the third magnet **3223** with respect to a central axis of the housing **3210**. At this time, the central axis of the housing **3210** may correspond to an optical axis. The dummy member **3230** may have a thickness corresponding to the third magnet **3223** in a direction perpendicular to the optical axis.

The first lens driving device **3010** may comprise a yoke **3240**. The second mover **3200** may comprise a yoke **3240**. The yoke **3240** may be disposed in the housing **3210**. The yoke **3240** may be disposed on a third side portion of the housing **3210**. The yoke **3240** may be disposed adjacent to the second lens driving device **3020**. Through this, magnetic force interference between the first lens driving device **3010** and the second lens driving device **3020** can be minimized.

The first lens driving device **3010** may comprise a stator **3300**. The stator **3300** may be disposed below the first and second movers **3100** and **3200**. The stator **3300** may movably support the second mover **3200**. The stator **3300** may move the second mover **3200**. At this time, the first mover **3100** can also move together with the second mover **3200**.

The first lens driving device **3010** may comprise a base **3310**. The stator **3300** may comprise a base **3310**. The base

3310 may be disposed below the housing **3210**. The base **3310** may be disposed below the substrate **3320**. A substrate **3320** may be disposed on an upper surface of the base **3310**. The base **3310** may be coupled to the cover member **3340**. The base **3310** may be disposed on the printed circuit board **3030**.

The base **3310** may comprise a step **3311**. The step **3311** may be formed on a side surface of the base **3310**. The step **3311** may be formed around an outer circumferential surface of the base **3310**. The step **3311** may be formed as a portion of a side surface of the base **3310** is protruded or recessed. A lower end of the lateral plate **3342** of the cover member **3340** may be disposed at the step **3311**.

The base **3310** may comprise a hole **3312**. The hole **3312** may be hollow. The hole **3312** may penetrate through the base **3310** in an optical axis direction. A light passing through the first lens **3041** through the hole **3312** may be incident to the image sensor.

The base **3310** may comprise a protrusion **3313**. The protrusion **3313** may be formed on an upper surface of the base **3310**. The protrusion **3313** may be protruded from an upper surface of the base **3310**. A second coil **3330** may be disposed at the protrusion **3313**. A second coil **3330** may be wound around the protrusion **3313** and disposed.

The first lens driving device **3010** may comprise a substrate **3320**. The stator **3300** may comprise a substrate **3320**. The substrate **3320** may be disposed at one side of the housing **3210**. The substrate **3320** may be disposed between the base **3310** and the housing **3210**. The substrate **3320** may be disposed on an upper surface of the base **3310**. A support member **3500** may be coupled to the substrate **3320**. The substrate **3320** may be electrically connected to the support member **3500**. One end of the support member **3500** may be fixed to the substrate **3320**. The substrate **3320** may be coupled to the printed circuit board **3030** being disposed below the base **3310** by soldering. The substrate **3320** may comprise a flexible printed circuit board (FPCB). The substrate **3320** may be partially bent.

The substrate **3320** may comprise a body part **3321**. A hole may be formed in the body part **3321**. The hole may be hollow penetrating the substrate **3320** in an optical axis direction. The substrate **3320** may comprise a hole. A support member **3500** may be disposed in the hole of the substrate **3320**. The support member **3500** may be disposed to penetrate through the hole of the substrate **3320**.

The substrate **3320** may comprise a first terminal unit **3322**. The first terminal unit **3322** may be extended downward from the body part **3321** of the substrate **3320**. The first terminal unit **3322** may be formed as a portion of the substrate **3320** is being bent. At least a portion of the first terminal unit **3322** may be exposed to the outside. The first terminal unit **3322** may be coupled to the printed circuit board **3030** being disposed below the base **3310** by soldering. The first terminal unit **3322** may be disposed in a groove of the base **3310**. The first terminal unit **3322** may comprise a plurality of terminals. The first terminal unit **3322** may be disposed between the gyro sensor **3050** and the second lens driving device **3010**.

The substrate **3320** may comprise a first terminal unit **3322** and a plurality of terminals being disposed in the first terminal unit **3322** and electrically connected to the printed circuit board **3030**. The first terminal unit **3322** of the substrate **3320** may be disposed at a position corresponding to the first lateral plate **3342-1** of the cover member **3340**. The first terminal unit **3322** of the substrate **3320** may be disposed closest to the first lateral plate **3342-1** among the first to fourth lateral plates **3342-1**, **3342-2**, **3342-3**, and

3342-4 of the cover member **3340**. In a direction in which the second lateral plate **3342-2** faces the first lateral plate **3342-1**, the first terminal unit **3322** may not be overlapped with the gyro sensor **3050**.

The first terminal unit **3322** may be disposed closer to one corner among the corners on both sides of the first lateral plate **3342-1** of the cover member **3340**. The first lateral plate **3342-1** of the cover member **3340** may comprise: a first region close to one of the corners on both sides; and a second region close to the other corner among the corners on both sides. The first terminal unit **3322** may be disposed at a position corresponding to a first region of the first lateral plate **3342-1**. The gyro sensor **3050** may be disposed at a position corresponding to the second region of the first lateral plate **3342-1**.

In a direction in which the third lateral plate **3342-3** faces the fourth lateral plate **3342-4**, the length of the first terminal unit **3322** may be shorter than the length of the second terminal unit **3323**. The substrate **3320** may comprise: a first terminal unit **3322** being disposed at a position corresponding to the first lateral plate **3342-1**; and a second terminal unit **3323** being disposed at a position corresponding to the second lateral plate **3342-2**. The width of the first terminal unit **3322** in a first direction may be smaller than the width of the second terminal unit **3323** in a first direction. The first terminal unit **3322** of the substrate **3320** may be omitted at a position corresponding to the gyro sensor **3050**.

In a first embodiment of the present embodiment, the first terminal unit **3322** may be driven to one side of the first lens driving device **3010** to secure an arrangement space for the gyro sensor **3050**. The first lens driving device **3010** may comprise a plurality of terminals. The terminals of the first lens driving device **3010** may comprise 17 terminals. Due to size limitations, the first terminal unit **3322** may comprise 7 terminals, and the second terminal unit **3323** may comprise 10 terminal units. Seven or less terminals may be disposed in the first terminal unit **3322**. Ten or more terminals may be disposed in the second terminal unit **3323**. The plurality of terminals of the first lens driving device **3010** may comprise: two terminals for the first coil **3120**; two terminals for the second-first and second-second coils **3331** and **3332**; two terminals for the second-third coil **3333**; four terminals for the first sensor **3610**; and eight terminals for the second sensor **3620**. At this time, when the ground terminal is commonly used among the eight terminals for the two second sensors **3620**, seven terminals may be required for the two second sensors **3620**.

The substrate **3320** may comprise a second terminal unit **3323**. The second terminal unit **3323** may be disposed at an opposite side of the first terminal unit **3322**. The second terminal unit **3323** of the substrate **3320** may be disposed at a position corresponding to the second lateral plate **3342-2** of the cover member **3340**.

The first lens driving device **3010** may comprise a second coil **3330**. The stator **3300** may comprise a second coil **3330**. The second coil **3330** may be an 'OIS coil'. The second coil **3330** may move the bobbin **3110**. The second coil **3330** may be disposed in the base **3310**. The second coil **3330** may be disposed in the substrate **3320**. The second coil **3330** may face the magnet **3220**. The second coil **3330** may interact with the magnet **3220** electromagnetically. In this case, when a current is supplied to the second coil **3330** and a magnetic field is formed around the second coil **3330**, the magnet **3220** may move against the second coil **3330** due to electromagnetic interaction between the second coil **3330** and the magnet **3220**. The second coil **3330** may move the housing **3210** and the bobbin **3110** in a direction perpen-

dicular to the optical axis with respect to the base 3310 through electromagnetic interaction with the magnet 3220. The substrate 3320 may comprise a second coil 3330. That is, the second coil 3330 may be a configuration of the substrate 3320. The second coil 3330 may be formed as a fine pattern coil (FP coil) in a substrate separate from the substrate 3320.

The second coil 3330 may comprise a plurality of coils. The second coil 3330 may comprise a number of coils corresponding to those of the magnet 3220. The second coil 3330 may comprise three coils. The second coil 3330 may comprise a second-first coil 3331, a second-second coil 3332, and a second-third coil 3333. The second-first coil 3331 may face the first magnet 3221. The second-second coil 3332 may face the second magnet 3222. The second-third coil 3333 may face the third magnet 3223.

The number of windings of the second-first coil 3331 may be greater than the number of windings of the second-second coil 3332 and the second-third coil 3333. The number of windings of the second-second coil 3332 may correspond to the number of windings of the second-third coil 3333. In a first embodiment of the present embodiment, the movement in an X-axis direction is performed through the second-first coil 3331 and the second-second coil 3332 during OIS driving, and the movement in a Y-axis direction can be performed through the second-third coil 3333. Therefore, in a first embodiment of the present embodiment, in order to compensate for the insufficient driving force in a Y-axis direction, the number of turns of the second-third coil 3333 may be higher than the number of turns of the second-first coil 3331 and the second-second coil 3332. For an example, the ratio of the number of turns of the second-third coil 3333 to the number of turns of the second-first and second-second coils 3331 and 3332 may be 1.5:2.0 to 1:1. Ideally, the ratio of the number of turns of the second-third coil 3333 to the number of turns of the second-first and second-second coils 3331 and 3332 is 1:1, but it can be disposed up to 1.5:2.0 due to the space constraint.

The first lens driving device 3010 may comprise a cover member 3340. The stator 3300 may comprise a cover member 3340. The cover member 3340 may comprise a 'cover can'. The cover member 3340 may comprise a yoke. The cover member 3340 may be disposed outside the housing 3210. The cover member 3340 may be coupled to the base 3310. The cover member 3340 may accommodate the housing 3210 therein. The cover member 3340 may form the outer appearance of the first lens driving device 3010. The cover member 3340 may have a hexahedral shape with an open lower surface. The cover member 3340 may be a non-magnetic material. The cover member 3340 may be formed of a metal material. The cover member 3340 may be formed of a metal plate material. The cover member 3340 may be connected to the ground portion of the printed circuit board 3030. Through this, the cover member 3340 may be grounded. The cover member 3340 may block electromagnetic interference (EMI). At this time, the cover member 3340 may be referred to as an 'EMI shield can'.

The cover member 3340 may comprise an upper plate 3341 and a lateral plate 3342. The cover member 3340 may comprise an upper plate 3341 comprising a hole and a lateral plate 3342 being extended downward from an outer circumference or edge of the upper plate 3341. The lower end of the lateral plate 3342 of the cover member 3340 may be disposed in the step 3311 of the base 3310. An inner surface of the lateral plate 3342 of the cover member 3340 may be fixed to the base 3310 by an adhesive.

The lateral plate 3342 of the cover member 3340 may comprise a plurality of lateral plates. The lateral plate 3342 may comprise four lateral plates. The lateral plate 3342 of the cover member 3340 may comprise: a first lateral plate 3342-1 being disposed at an opposite side to each other; a second lateral plate 3342-2; a third lateral plate 3342-3 being disposed at an opposite side to each other; and a fourth lateral plate 3342-4. The gyro sensor 3050 may be disposed closest to the first lateral plate 3342-1 among the first to fourth lateral plates 3342-1, 3342-2, 3342-3, and 3342-4. The first terminal unit 3322 of the substrate 3320 may be disposed at a position corresponding to the first lateral plate 3342-1 of the cover member 3340.

The cover member 3340 may comprise a groove 3343. The groove 3343 may be formed in the lateral plate 3342 of the cover member 3340. The groove 3343 may be formed at a lower end of the lateral plate 3342. The groove 3343 may be formed at a position corresponding to the first terminal unit 3322. The groove 3343 may be formed to expose the first terminal unit 3322 to the outside.

The first lens driving device 3010 may comprise a terminal 3350. The stator 3300 may comprise a terminal 3350. The terminal 3350 may be disposed in the base 3310. The terminal 3350 may be electrically connected to the substrate 3320. The terminal 3350 may be coupled to the support member 3500. The terminal 3350 may electrically connect the support member 3500 and the substrate 3320.

The first lens driving device 3010 may comprise an elastic member 3400. The elastic member 3400 may be an 'AF support member'. At least portion of the elastic member 3400 may have elasticity. The elastic member 3400 may be formed of metal. The elastic member 3400 may be formed of a conductive material. The elastic member 3400 may connect the bobbin 3110 and the housing 3210. The elastic member 3400 may elastically connect the bobbin 3110 and the housing 3210. The elastic member 3400 may be coupled to the bobbin 3110 and the housing 3210. The elastic member 3400 may elastically support the bobbin 3110. The elastic member 3400 may movably support the bobbin 3110. The elastic member 3400 may support the movement of the bobbin 3110 during AF driving.

The elastic member 3400 may comprise a first elastic member 3410. The first elastic member 3410 may be an 'upper elastic member'. The first elastic member 3410 may connect the housing 3210 and the bobbin 3110. The first elastic member 3410 may be coupled to an upper portion of the bobbin 3110 and an upper portion of the housing 3210. The first elastic member 3410 may be coupled to an upper surface of the bobbin 3110. The first elastic member 3410 may be coupled to an upper surface of the housing 3210. The first elastic member 3410 may be coupled to the support member 3500. The first elastic member 3410 may be formed of a leaf spring. The first elastic member 3410 may be separated and used as a power line for electrical or communication signal.

The first elastic member 3410 may comprise a plurality of elastic units. The first elastic member 3410 may comprise three elastic units. The first elastic member 3410 may comprise first to third elastic units 3410-1, 3410-2, and 3410-3. The first elastic unit 3410-1 may connect the support member 3500 and one end of the first-first coil 3121. The second elastic unit 3410-2 may connect the other end of the first-first coil 3121 and one end of the first-second coil 3122. The third elastic unit 3410-3 may connect the other end of the first-second coil 3122 and the support member 3500. The first elastic member 3410 may be electrically connected to

the first coil **3120**. The first elastic member **3410** may electrically connect the first coil **3120** and the support member **3500**.

The first elastic member **3410** may comprise an outer side portion **3411**. The outer side portion **3411** may be coupled to the housing **3210**. The outer side portion **3411** may be coupled to an upper surface of the housing **3210**. The outer side portion **3411** may comprise a hole or groove being coupled to the protrusion of the housing **3210**. The outer side portion **3411** may be fixed to the housing **3210** by an adhesive.

The first elastic member **3410** may comprise an inner side portion **3412**. The inner side portion **3412** may be coupled with the bobbin **3110**. The inner side portion **3412** may be coupled to an upper surface of the bobbin **3110**. The inner side portion **3412** may comprise a hole or groove being coupled to a protrusion of the bobbin **3110**. The inner side portion **3412** may be fixed to the bobbin **3110** by an adhesive.

The first elastic member **3410** may comprise a connecting portion **3413**. The connecting portion **3413** may connect the inner side portion **3412** and the outer side portion **3411**. The connecting portion **3413** may have elasticity. At this time, the connecting portion **3413** may be referred to as an 'elastic portion'. The connecting portion **3413** may comprise a shape bent two or more times.

The first elastic member **3410** may comprise a connecting portion **3414**. The connecting portion **3414** may be extended from an outer side portion **3411**. The connecting portion **3414** may be coupled to the support member **3500**. The connecting portion **3414** and the support member **3500** may be coupled by soldering.

The elastic member **3400** may comprise a second elastic member **3420**. The second elastic member **3420** may be a 'lower elastic member'. The second elastic member **3420** may be disposed below the first elastic member **3410**. The second elastic member **3420** may be disposed on one side of the first elastic member **3410**. The second elastic member **3420** may connect the housing **3210** and the bobbin **3110**. The second elastic member **3420** may be disposed below the bobbin **3110**. The second elastic member **3420** may be coupled to the bobbin **3110** and the housing **3210**. The second elastic member **3420** may be coupled to a lower surface of the bobbin **3110**. The second elastic member **3420** may be coupled to a lower surface of the housing **3210**. The second elastic member **3420** may be formed of a leaf spring. The second elastic member **3420** may be integrally formed.

The second elastic member **3420** may comprise an outer side portion **3421**. The outer side portion **3421** may be coupled to the housing **3210**. The outer side portion **3421** may be coupled to a lower surface of the housing **3210**. The outer side portion **3421** may comprise a hole or groove being coupled to the protrusion of the housing **3210**. The outer side portion **3421** may be fixed to the housing **3210** by an adhesive.

The second elastic member **3420** may comprise an inner side portion **3422**. The inner side portion **3422** may be coupled to the bobbin **3110**. The inner side portion **3422** may be coupled to a lower surface of the bobbin **3110**. The inner side portion **3422** may comprise a hole or groove being coupled to a protrusion of the bobbin **3110**. The inner side portion **3422** may be fixed to the bobbin **3110** by an adhesive.

The second elastic member **3420** may comprise a connecting portion **3423**. The connecting portion **3423** may connect an inner side portion **3422** and an outer side portion **3421**. The connecting portion **3423** may have elasticity. At

this time, the connecting portion **3423** may be referred to as an 'elastic portion'. The connecting portion **3423** may comprise a shape bent two or more times.

The first lens driving device **3010** may comprise a support member **3500**. The support member **3500** may be an 'OIS support member'. The support member **3500** may connect the first elastic member **3410** and the substrate **3320** or the first elastic member **3410** and the terminal **3350**. The support member **3500** may be coupled to an upper surface of the first elastic member **3410** and the terminal **3350**. The support member **3500** may movably support the housing **3210**. The support member **3500** may elastically support the housing **3210**. At least a portion of the support member **3500** may have elasticity. The support member **3500** may elastically support the movement of the housing **3210** and the bobbin **3110** during OIS driving. One end of the support member **3500** may be coupled to the first elastic member **3410** by soldering. The other end of the support member **3500** may be coupled to the terminal **3350** by soldering.

The support member **3500** may comprise a plurality of wires. The support member **3500** may comprise four wires. The plurality of wires may comprise four wires connecting the three first elastic units **3410-1**, **3410-2**, and **3410-3** and the substrate **3320**. As a modified example, the support member **3500** may be formed of a leaf spring.

The first lens driving device **3010** may comprise a first sensor **3610**. The first sensor **3610** may be disposed in the base **3310**. The first sensor **3610** may detect the sensing magnet **3130**. The first sensor **3610** may be disposed in the substrate **3320**. The first sensor **3610** may be coupled to a lower surface of the substrate **3320**. The first sensor **3610** may be spaced apart from the housing **3210**. The first sensor **3610** may be spaced apart from the bobbin **3110**. The first sensor **3610** may be overlapped with the sensing magnet **3130** in an optical axis direction. The first sensor **3610** may detect the position of the sensing magnet **3130** for AF feedback control. The first sensor **3610** may be a Hall IC, a Hall element, or a Hall sensor. The first sensor **3610** may detect the magnetic force of the sensing magnet **3130**.

The first lens driving device **3010** may comprise a second sensor **3620**. The second sensor **3620** may be disposed between the base **3310** and the substrate **3320**. The second sensor **3620** may detect the movement of the second mover **3300**. The second sensor **3620** may detect the movement of the housing **3210** and the magnet **3220** by detecting the magnetic force of the magnet **3220**. A detection value detected by the second sensor **3620** may be used for OIS feedback control. The second sensor **3620** may comprise a plurality of Hall sensors. The second sensor **3620** may comprise two Hall sensors. The second sensor **3620** may comprise a first Hall sensor for detecting the movement in an x-axis direction in the horizontal direction and a second Hall sensor for detecting the movement in a y-axis direction in the horizontal direction.

The first lens driving device **3010** may comprise a damper. The damper may be disposed in the support member **3500**. The damper may be disposed in the support member **3500** and the housing **3210**. The damper may be disposed in the elastic member. The damper may be disposed in the elastic member **3400** and/or the support member **3500** to prevent a resonance phenomenon generated in the elastic member **3400** and/or the support member **3500**.

The camera device **3002** may comprise a second lens driving device **3020**. The second lens driving device **3020** may be a voice coil motor (VCM). The second lens driving device **3020** may be a lens driving motor. The second lens driving device **3020** may be a lens driving actuator. The

second lens driving device **3020** may comprise an AF module. The second lens driving device **3020** may comprise an OIS module. The second lens driving device **3020** may be disposed on a first surface of the printed circuit board **3030**. The second lens driving device **3020** may be disposed closest to the third lateral plate **3342-3** among the first to fourth lateral plates **3342-1**, **3342-2**, **3342-3**, and **3342-4** of the first lens driving device **3010**.

The second lens driving device **3020** may comprise a first mover. The first mover may be coupled to the second lens **3042**. The first mover may be connected to the second mover through the first elastic member and/or the second elastic member. The first mover may move through interaction with the second mover. At this time, the first mover can move integrally with the second lens **3042**. Meanwhile, the first mover may move during AF driving. At this time, the first mover may be referred to as an 'AF mover'. However, the first mover may move together with the second mover even during OIS driving.

The second lens driving device **3020** may comprise a bobbin. The first mover may comprise a bobbin. A bobbin may be disposed inside the housing. The bobbin may be disposed in a hole in the housing. The bobbin may be movably coupled to the housing. The bobbin is movable against the housing in an optical axis direction. A second lens **3042** may be coupled to the bobbin. The bobbin and the second lens **3042** may be coupled by screw-coupling and/or an adhesive. A first coil may be coupled to the bobbin. A first elastic member may be coupled to an upper portion or upper surface of the bobbin. A second elastic member may be coupled to a lower portion or lower surface of the bobbin. The bobbin may be coupled to the first elastic member and/or the second elastic member by thermal fusion and/or an adhesive. The adhesive for coupling the bobbin and the second lens **3042** and the bobbin and the elastic member may be an epoxy cured by at least one among ultraviolet (UV) light, heat, and laser.

The second lens driving device **3020** may comprise a first coil. The first mover may comprise a first coil. The first coil may be an 'AF driving coil' used for AF driving. The first coil may be disposed in the bobbin. The first coil may move the bobbin. The first coil may be disposed between the bobbin and the housing. The first coil may be disposed on an outer lateral surface or an outer circumferential surface of the bobbin. The first coil may be directly wound in the bobbin. Or, the first coil may be coupled to the bobbin in a directly wound state. The first coil may face the magnet **3022**. The first coil may be disposed to face the magnet **3022**. The first coil may interact electromagnetically with the magnet **3022**. In this case, when a current is supplied to the first coil and an electromagnetic field is formed around the first coil, the first coil may move against the magnet **3022** due to the electromagnetic interaction between the first coil and the magnet **3022**.

The first coil may comprise a plurality of coils. The first coil may comprise two coils. The first coil may comprise first-first and first-second coils. The first-first coil may be disposed at a position corresponding to the first lateral plate of the cover member. The first-first coil may be disposed to face the first lateral plate of the cover member. The first-second coil may be disposed at a position corresponding to the second lateral plate of the cover member. The first-second coil may be disposed to face the second lateral plate of the cover member.

In a first embodiment of the present embodiment, the first coil and the magnet **3022** may move the bobbin in an optical axis direction against the housing. The first coil and the

magnet **3022** may move the bobbin in an optical axis direction through an electromagnetic interaction. The first coil and the magnet **3022** may be used for AF driving.

The second lens driving device **3020** may comprise a coil. The coil can move the bobbin. The coil may comprise a first coil for moving the bobbin in an optical axis direction and a second coil for moving the bobbin in a direction perpendicular to the optical axis direction.

The second lens driving device **3020** may comprise a sensing magnet. The first mover may comprise a sensing magnet. A sensing magnet may be disposed in the bobbin. The sensing magnet may be detected through the first sensor. In addition, the second lens driving device **3020** may comprise a compensation magnet. The first mover may comprise a compensation magnet. The compensation magnet may be disposed to achieve magnetic force balance with the sensing magnet. The compensation magnet may have a weight corresponding to that of the sensing magnet. The compensation magnet may be disposed symmetrically with the sensing magnet with respect to an optical axis.

The second lens driving device **3020** may comprise a second mover. The second mover may be movably coupled to the stator through a support member. The second mover may support the first mover through the first and second elastic members. The second mover may move the first mover or move together with the first mover. The second mover may move through the interaction with the stator. The second mover can move during OIS driving. At this time, the second mover may be referred to as an 'OIS mover'. The second mover can move integrally with the first mover during OIS driving.

The second lens driving device **3020** may comprise a housing. The second mover may comprise a housing. The housing may be spaced apart from the base. The housing may be disposed outside the bobbin. The housing can accommodate at least a portion of the bobbin. The housing may be disposed inside the cover member. The housing may be disposed between the cover member and the bobbin. The housing may be formed of a material different from that of the cover member. The housing may be formed of an insulating material. The housing may be formed through injection molding. An outer side surface of the housing may be spaced apart from an inner surface of a lateral plate of the cover member. The housing may be moved for OIS driving through the separation space between the housing and the cover member. A magnet **3022** may be disposed in the housing. The housing and the magnet **3022** may be coupled by an adhesive. A first elastic member may be coupled to an upper portion or upper surface of the housing. A second elastic member may be coupled to a lower portion or lower surface of the housing. The housing may be coupled to an upper portion and the second elastic member by thermal fusion and/or an adhesive. An adhesive coupling the housing and the magnet **3022** and the housing and the elastic member may be an epoxy cured by at least one among ultraviolet (UV) light, heat, and laser.

The housing may comprise four side portions and four corner portions being disposed between the four side portions. The side portion of the housing may comprise: a first side portion; a second side portion being disposed at an opposite side of the first side portion; and a third side portion and a fourth side being disposed at an opposite side to each other between the first side portion and the second side portion. The corner portion of the housing may comprise: a first corner portion being disposed between the first side portion and the third side portion; a second corner portion being disposed between the first side portion and the fourth

side portion; a third corner portion being disposed between a second side portion and the third side portion; and a fourth corner portion being disposed between the second side portion and the fourth side portion. A side portion of the housing may comprise a 'lateral wall'. The first side portion of the housing may be disposed at a position corresponding to the first lateral plate of the cover member. The second side portion of the housing may be disposed at a position corresponding to the second lateral plate of the cover member. The third side portion of the housing may be disposed at a position corresponding to the third lateral plate of the cover member. The fourth side portion of the housing may be disposed at a position corresponding to the fourth lateral plate of the cover member.

The second lens driving device **3020** may comprise a magnet **3022**. The second mover may comprise a magnet **3022**. The magnet **3022** may be disposed in the housing. The magnet **3022** may be disposed inside the cover member. The magnet **3022** may be fixed to the housing by an adhesive. The magnet **3022** may be disposed between the bobbin and the housing. The magnet **3022** may face the first coil. The magnet **3022** may interact electromagnetically with the first coil. The magnet **3022** may move the bobbin in an optical axis direction through the interaction with the first coil. The magnet **3022** may be used for AF driving. The magnet **3022** may face the second coil. The magnet **3022** may interact electromagnetically with the second coil. The magnet **3022** may move the bobbin and the housing in a direction perpendicular to the optical axis direction through the interaction with the second coil. The magnet **3022** may be used for OIS driving. The magnet **3022** may be disposed in a plurality of side portions of the housing. The magnet **3022** may be a flat magnet having a flat plate shape.

The magnet **3022** may comprise a plurality of magnets. The magnet **3022** may comprise three magnets. The magnet **3022** may comprise first to third magnets. The first magnet may be disposed in a first side portion of the housing. The second magnet may be disposed in a second side portion of the housing. The third magnet may be disposed in a fourth side portion of the housing. A dummy member may be disposed in a third side portion of the housing.

The first magnet may face the first-first coil. The second magnet may face the first-second coil. The first and second magnets may be used during AF driving. The magnet may comprise: a first magnet being disposed at a position corresponding to the first lateral plate of the cover member; a second magnet being disposed at a position corresponding to the second lateral plate; and a third magnet being disposed at a position corresponding to the fourth lateral plate.

The first magnet may face the second-first coil. The second magnet may face the second-second coil. The first and second magnets may be used when driving in an OIS-x-axis direction. The third magnet may face the second-third coil. The third magnet may be used when driving in an OIS-y-axis direction. The area of the lower surface of the third magnet may be larger than that of each of the lower surfaces of the first and second magnets.

The second lens driving device **3020** may comprise a dummy member. The second mover may comprise a dummy member. The dummy member may be disposed in the housing. The dummy member may be disposed in the third side portion of the housing. The dummy member may be disposed adjacent to the second lens driving device **3020**. Through this, magnetic force interference between the second lens driving device **3020** and the second lens driving

device **3020** may be minimized. The dummy member may be disposed at a position corresponding to the third lateral plate of the cover member.

The dummy member may have a weight corresponding to that of the third magnet. The dummy member may have weaker magnetic force than the third magnet or may not have magnetic force. The dummy member may be disposed at an opposite side of the third magnet in the housing. The weight of the dummy member may correspond to the weight of the third magnet. However, the dummy member may have a weight lighter than that of the third magnet. Or, the dummy member may have a weight heavier than that of the third magnet. The dummy member may be within 80% of the weight of the third magnet to 120% of the weight of the third magnet. When the weight of the dummy member is less than the lower limit or exceeds the upper limit of the above-mentioned value, the weight balancing of the OIS driving unit may collapse.

The dummy member may be a non-magnetic material. The dummy member may comprise a non-magnetic material. The magnetic strength of the dummy member may be weaker than that of the third magnet. The dummy member may be disposed at an opposite side of the third magnet to align the center of gravity. The dummy member may be made of 95% or more of tungsten. That is, the dummy member may be a tungsten alloy. For example, the specific gravity of the dummy member may be 18000 or more. The dummy member may be disposed at a position symmetrical to the third magnet with respect to the central axis of the housing. At this time, the central axis of the housing may correspond with an optical axis. The dummy member may have a thickness corresponding to the third magnet and a direction perpendicular to the optical axis.

The second lens driving device **3020** may comprise a yoke. The second mover may comprise a yoke. The yoke may be disposed in the housing. The yoke may be disposed in the third side portion of the housing. The yoke may be disposed adjacent to the second lens driving device **3020**. Through this, magnetic force interference between the second lens driving device **3020** and the second lens driving device **3020** may be minimized.

The second lens driving device **20** may comprise a yoke **2240**. The second mover **2200** may comprise a yoke **2240**. The yoke **2240** may be disposed in the second housing **2210**. The yoke **2240** may be disposed in the first side portion of the second housing **2210**. The yoke **2240** may be disposed adjacent to the first lens driving device **10**. Through this, magnetic force interference between the first lens driving device **10** and the second lens driving device **20** can be minimized.

The second lens driving device **3020** may comprise a stator. The stator may be disposed below the first and second movers. The stator may movably support the second mover. The stator may move the second mover. At this time, the first mover can also move with the second mover.

The second lens driving device **3020** may comprise a base. The stator may comprise a base. The base may be disposed below the housing. The base can be disposed below the substrate. A substrate may be placed on an upper surface of the base. The base may be coupled with the cover member. The base may be disposed on the printed circuit board **3030**.

The second lens driving device **3020** may comprise a substrate. The stator may comprise a substrate. A substrate may be disposed at one side of the housing. A substrate may be disposed between the base and the housing. The substrate may be placed on an upper surface of the base. A support

member may be coupled to the substrate. The substrate may be electrically connected to the support member. One end of the support member may be fixed to the substrate. The substrate may be coupled to the printed circuit board **3030** being disposed below the base by soldering. The substrate may comprise a flexible printed circuit board (FPCB). The substrate may be bent in part.

The substrates may comprise a body part. A hole may be formed in the body part. The hole may be hollow penetrating the substrate in an optical axis direction. The substrate may comprise a hole. A support member may be disposed in the hole of the substrate. The support member may be disposed to pass through the hole of the substrate.

The second lens driving device **3020** may comprise a terminal unit **3021**. The terminal unit **3021** may be extended from the body part. The terminal unit **3021** may be extended downward from the body part. The terminal unit **3021** may be bent from the body part. The terminal unit **3021** may comprise a plurality of terminal units. The terminal unit **3021** may comprise a first terminal unit and a second terminal unit being disposed at an opposite side of the first terminal unit. In the second lens driving device **3020**, the first terminal unit and the second terminal unit may have the same width. The first terminal unit may be disposed to correspond to the first lateral plate of the cover member, and the second terminal unit may be disposed to correspond to the second lateral plate of the cover member.

The second lens driving device **3020** may comprise a second coil. The stator may comprise a second coil. The second coil may be an 'OIS coil'. The second coil may move the bobbin. A second coil may be disposed in the base. A second coil may be disposed in the substrate. The second coil may face the magnet **3022**. The second coil may interact electromagnetically with the magnet **3022**. In this case, when a current is supplied to the second coil and a magnetic field is formed around the second coil, the magnet **3022** may move against the second coil due to electromagnetic interaction between the second coil and the magnet **3022**. The second coil may move the housing and the bobbin in a direction perpendicular to the optical axis with respect to the base through electromagnetic interaction with the magnet **3022**. The substrate may comprise a second coil. That is, the second coil may be a configuration of the substrate. The second coil may be formed as a fine pattern coil (FP coil) in a substrate separate from the substrate.

The second coil may comprise a plurality of coils. The second coil may comprise a number of coils corresponding to the magnet **3022**. The second coil may comprise three coils. The second coil may comprise a second-first coil, a second-second coil, and a second-third coil. The second-first coil may face the first magnet. The second-second coil may face the second magnet. The second-third coil may face the third magnet.

The second lens driving device **3020** may comprise a cover member. The stator may comprise a cover member. The cover member may comprise a 'cover can'. The cover member may comprise a yoke. The cover member may be disposed outside the housing. The cover member may be coupled to the base. The cover member can accommodate the housing therein. The cover member may form the outer appearance of the second lens driving device **3020**. The cover member may have a hexahedral shape with an open lower surface. The cover member may be a non-magnetic material. The cover member may be formed of a metal material. The cover member may be formed of a metal plate. The cover member may be connected to the ground portion of the printed circuit board **3030**. Through this, the cover

member may be grounded. The cover member may block electromagnetic interference (EMI). At this time, the cover member may be referred to as an 'EMI shield can'.

The cover member may comprise an upper plate and a lateral plate. The cover member may comprise an upper plate comprising a hole and a lateral plate being extended downward from an outer circumference or edge of the upper plate. The lower end of the lateral plate of the cover member may be disposed in a step of the base. An inner surface of the lateral plate of the cover member may be fixed to the base by an adhesive.

The lateral plate of the cover member may comprise a plurality of lateral plates. The lateral plate may comprise four lateral plates. The lateral plates of the cover member may comprise a first lateral plate and a second lateral plate being disposed at an opposite side to each other, and a third lateral plate and a fourth lateral plate being disposed at an opposite side to each other. The third lateral plate of the second lens driving device **3020** may face the third lateral plate **3342-3** of the first lens driving device **3010**.

The second lens driving device **3020** may comprise a terminal. The stator may comprise a terminal. The terminals can be disposed in the base. The terminal may be electrically connected to a substrate. The terminal may be coupled to a support member. The terminal may electrically connect the support member and the substrate.

The second lens driving device **3020** may comprise an elastic member. The elastic member may be an 'AF support member'. The elastic member may have elasticity at least in part. The elastic member may be formed of metal. The elastic member may be formed of a conductive material. The elastic member may connect the bobbin and the housing. The elastic member may elastically connect the bobbin and the housing. The elastic member may be coupled to the bobbin and the housing. The elastic member may elastically support the bobbin. The elastic member may movably support the bobbin. The elastic member may support movement of the bobbin during AF driving.

The elastic member may comprise a first elastic member. The first elastic member may be an 'upper elastic member'. The first elastic member may connect the housing and the bobbin. The first elastic member may be coupled to an upper portion of the bobbin and an upper portion of the housing. The first elastic member may be coupled to an upper surface of the bobbin. The first elastic member may be coupled to an upper surface of the housing. The first elastic member may be coupled to the support member. The first elastic member may be formed as a leaf spring. The first elastic member may be separated and used as a power line for electrical or communication signal.

The first elastic member may comprise a plurality of elastic units. The first elastic member may comprise three elastic units. The first elastic member may comprise first to third elastic units. The first elastic unit may connect the support member and one end of the first-first coil. The second elastic unit may connect the other end of the first-first coil and one end of the first-second coil. The third elastic unit may connect the other end of the first-second coil to the support member. The first elastic member may be electrically connected to the first coil. The first elastic member may electrically connect the first coil and the support member.

The first elastic member may comprise an outer side portion. The outer side portion may be coupled to the housing. The outer side portion may be coupled to an upper surface of the housing. The outer side portion may comprise

a hole or groove being coupled to a protrusion of the housing. The outer side portion may be fixed to the housing by an adhesive.

The first elastic member may comprise an inner side portion. The inner side portion may be coupled with the bobbin. The inner side portion may be coupled to an upper surface of the bobbin. The inner side portion may comprise a hole or groove being coupled to a protrusion of the bobbin. The inner side portion may be fixed to the bobbin by an adhesive.

The first elastic member may comprise a connecting portion. The connecting portion may connect an inner side portion and an outer side portion. The connecting portion may have elasticity. At this time, the connecting portion may be referred to as an 'elastic portion'. The connecting portion may comprise a shape bent two or more times.

The first elastic member may comprise a coupling portion. The coupling portion may be extended from an outer side portion. The coupling portion may be coupled to the support member. The coupling portion and the support member may be coupled by a solder.

The elastic member may comprise a second elastic member. The second elastic member may be a 'lower elastic member'. The second elastic member may be disposed below the first elastic member. The second elastic member may be disposed at one side of the first elastic member. The second elastic member may connect the housing and the bobbin. The second elastic member may be disposed below the bobbin. The second elastic member may be coupled to the bobbin and the housing. The second elastic member may be coupled to a lower surface of the bobbin. The second elastic member may be coupled to a lower surface of the housing. The second elastic member may be formed as a leaf spring. The second elastic member may be integrally formed.

The second elastic member may comprise an outer side portion. The outer side portion may be coupled to the housing. The outer side portion may be coupled to a lower surface of the housing. The outer side portion may comprise a hole or groove being coupled to the protrusion of the housing. The outer side portion may be fixed to the housing by an adhesive.

The second elastic member may comprise an inner side portion. The inner side portion may be coupled with the bobbin. The inner side portion may be coupled to a lower surface of the bobbin. The inner side portion may comprise a hole or groove being coupled to the protrusion of the bobbin. The inner side portion may be fixed to the bobbin by an adhesive.

The second elastic member may comprise a connecting portion. The connecting portion may connect an inner side portion and an outer side portion. The connecting portion may have elasticity. At this time, the connecting portion may be referred to as an 'elastic portion'. The connecting portion may comprise a shape bent two or more times.

The second lens driving device **3020** may comprise a support member. The support member may be an 'OIS support member'. The support member may connect the first elastic member to the substrate or the first elastic member to the terminal. The support member may be coupled to an upper surface of the first elastic member and the terminal. The support member may movably support the housing. The support member may elastically support the housing. The support member may have elasticity at least in part. The support member may elastically support the movement of the housing and the bobbin during OIS driving. One end of the support member may be coupled to the first elastic

member by soldering. The other end of the support member may be coupled to the terminal by soldering.

The support member may comprise a plurality of wires. The support member may comprise four wires. The plurality of wires may comprise four wires connecting the three first elastic units **3410-1**, **3410-2**, and **3410-3** and the substrate. As a modified embodiment, the support member may be formed as a leaf spring.

The second lens driving device **3020** may comprise a first sensor. The first sensor may be disposed in the base. The first sensor may detect a sensing magnet. The first sensor may be disposed in the substrate. The first sensor may be coupled to a lower surface of the substrate. The first sensor may be spaced apart from the housing. The first sensor may be spaced apart from the bobbin. The first sensor may be overlapped with the sensing magnet in an optical axis direction. The first sensor may detect the position of the sensing magnet for AF feedback control. The first sensor may be a Hall IC, a Hall element, or a Hall sensor. The first sensor may detect the magnetic force of the sensing magnet.

The second lens driving device **3020** may comprise a second sensor. The second sensor may be disposed between the base and the substrate. The second sensor may detect the movement of the second mover. The second sensor may detect the movement of the housing and the magnet by detecting the magnetic force of the magnet. A detection value detected by the second sensor may be used for OIS feedback control. The second sensor may comprise a plurality of Hall sensors. The second sensor may comprise two Hall sensors. The second sensor may comprise a first Hall sensor for detecting the movement in an x-axis direction in the horizontal direction and a second Hall sensor for detecting the movement in a y-axis direction in the horizontal direction.

The second lens driving device **3020** may comprise a damper. The damper may be disposed in the support member. The damper may be disposed in the support member and the housing. The damper may be disposed in the elastic member. The damper may be disposed in the elastic member and/or the support member to prevent a resonance phenomenon generated in the elastic member and/or the support member.

Hereinafter, an optical device according to a first embodiment of present embodiment will be described with reference to drawings.

FIG. **15** is a perspective view of an optical device according to a first embodiment of the present embodiment.

Optical devices comprise cell phones, portable phones, smart phones, portable communication devices, portable smart devices, portable terminals, digital cameras, computers, laptop computers, digital broadcasting terminals, personal digital assistants (PDAs), portable multimedia players (PMPs) and navigation. However, the type of optical device is not limited thereto, and any device for photographing a video or photo may be comprised in the optical device.

The optical device may comprise a main body **3001**. The main body **1** may form the outer appearance of an optical device. The main body **3001** can accommodate the camera device **3002**. A display **3003** may be disposed at a first surface of the main body **3001**. For example, the display **3003** and the camera device **3002** are disposed at a first surface of the main body **3001**, and a camera device **3002** may be additionally disposed at a second surface at an opposite side of the first surface of the main body **3001**.

The optical device may comprise a camera device **3002**. The camera device **3002** may be disposed in the main body **3001**. At least a portion of the camera device **3002** may be

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accommodated inside the main body **3001**. The camera device **3002** may be provided in plurality. The camera device **3002** may comprise dual, triple or more camera devices. The camera device **3002** may be disposed at each of the first surface of the main body **3001** and the second surface at an opposite side of the first surface of the main body **3001**. The camera device **3002** may photograph an image and/or video of a subject.

The optical device may comprise a display **3003**. The display **3003** may be disposed in the main body **3001**. The display **3003** may be disposed at a first surface of the main body **3001**. The display **3003** may output images and/or videos photographed by the camera device **3002**.

Hereinafter, a configuration of a camera device according to a second embodiment of the present embodiment will be described with reference to the drawings.

FIG. **16** is a schematic diagram of a camera device according to a second embodiment of the present embodiment; and FIG. **17** is a perspective view of a camera device according to a second embodiment of the present embodiment.

The camera device **2** may comprise a camera module.

The camera device **2** may comprise a lens driving device. The camera device **2** may comprise a plurality of lens driving devices. The camera device **2** may comprise two lens driving devices. The camera device **2** may comprise a first and second lens driving devices **10** and **20**. The camera device **2** may comprise a dual camera module. The camera device **2** may comprise three or more lens driving devices.

The camera device **2** may comprise a printed circuit board (PCB) **30**. The printed circuit board **30** may be a substrate or circuit substrate. A lens driving device may be disposed in the printed circuit board **30**. A first and second lens driving devices **10** and **20** may be disposed in the printed circuit board **30**. A sensor base may be disposed between the printed circuit board **30** and the lens driving device **10**. The printed circuit board **30** may be electrically connected to the lens driving device. The printed circuit board **30** may be electrically connected to the first and second lens driving devices **10** and **20**. An image sensor may be disposed in the printed circuit board **30**. A gyro sensor **50** may be disposed in the printed circuit board **30**. The printed circuit board **30** may comprise various circuits, elements, control units, and the like in order to convert an image being formed on an image sensor into an electrical signal and transmit it to an external device.

The printed circuit board **30** may comprise: a first portion **21** in which a lens driving device is disposed; a second portion **22** in which a connector is disposed; and a third portion **23** connecting the first portion **21** and the second portion **22**.

The camera device **2** may comprise a connector. The connector may be electrically connected to the printed circuit board **30**. The connector may comprise a port for electrically connecting with an external device. The connector may be disposed in the third portion **33** of the printed circuit board **30**.

The camera device **2** may comprise a lens module. The lens module may be coupled to the bobbin of the lens driving device. The lens module may be coupled to the bobbin by screw-coupling and/or an adhesive. The lens module may move integrally with the bobbin. The lens module may comprise a lens. The lens module may comprise a barrel and a plurality of lenses disposed inside the barrel. The lens may be disposed at a position corresponding to the image sensor. The lens may comprise a first lens **41** being coupled to the

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first lens driving device **10**. The lens may comprise a second lens **42** being coupled to the second lens driving device **20**.

The camera device **2** may comprise a filter. The filter may serve to block light of a specific frequency band among the light passing through the lens module from being incident on the image sensor. The filter may be disposed parallel to an x-y plane. The filter may be disposed between the lens module and the image sensor. A filter may be disposed in the sensor base. The filter may comprise an infrared filter. The infrared filter may block light in the infrared region from being incident on the image sensor. The infrared filter may comprise an infrared reflection filter or an infrared absorption filter.

The camera device **2** may comprise a sensor base. The sensor base may be disposed between the lens driving device and the printed circuit board **30**. An opening may be formed in a portion of the sensor base where the filter is disposed so that light passing through the filter may be incident on the image sensor.

The camera device **2** may comprise an image sensor. The image sensor may be configured to form an image by incident light passing through a lens and a filter. The image sensor may be disposed on the printed circuit board **30**. The image sensor may be mounted on the printed circuit board **30**. The image sensor may be electrically connected to the printed circuit board **30**. As an example, the image sensor may be coupled to the printed circuit board **30** by a surface mounting technology (SMT). As another example, the image sensor may be coupled to the printed circuit board **30** by a flip chip technology. The image sensor may be disposed such that an optical axis coincides with a lens. That is, the optical axis of the image sensor and the optical axis of the lens may be aligned. The image sensor may convert light irradiated onto an effective image area of the image sensor into an electrical signal. The image sensor may be any one of a charge coupled device (CCD), a metal oxide semiconductor (MOS), a CPD, and a CID.

The camera device **2** may comprise electronic components. The camera device **2** may comprise an electric element. The electronic component may be a gyro sensor **50**. The camera device **2** may comprise a gyro sensor **50**. The gyro sensor **50** may be disposed in the printed circuit board **30**. The gyro sensor **50** may be disposed on an upper surface of the printed circuit board **30**. The gyro sensor **50** may be disposed on a first surface of the printed circuit board **30**.

In a second embodiment of the present embodiment, the first lateral plate **1342-1** of the first cover **1340** may be disposed to face the first lateral plate **2342-1** of the second cover **2340**. A first substrate **1320** may comprise a terminal unit comprising terminals being coupled to the printed circuit board **30**. The terminal unit of the first substrate **1320** may comprise a first terminal unit **1322** being disposed at a position corresponding to the first lateral plate **1342-1** of the first cover **1340**. The terminal unit of the first substrate **1320** may comprise a second terminal unit **1322** being disposed at a position corresponding to the second lateral plate **1342-2** of the first cover **1340**. At this time, the gyro sensor **50** may be disposed adjacent to the third lateral plate **1342-3** of the first cover **1340**.

The gyro sensor **50** may be disposed to be spaced apart from the first lens driving device **10**. The gyro sensor **50** may be disposed in contact with the first lens driving device **10**. The gyro sensor **50** may be disposed spaced apart from the first cover **1340**. The gyro sensor **50** may be disposed in contact with the first cover **1340**. The gyro sensor **50** may be disposed to be closest to the third lateral plate **1342-3** among the first to fourth lateral plates **1342-1**, **1342-2**, **1342-3**, and

1342-4 of the first cover **1340**. The gyro sensor **50** may be disposed to be closer to the second lateral plate **1342-2** than to the first lateral plate **1342-1**.

The body part **1321** of the first substrate **1320** may comprise: a first region in which the second-first coil **1331** is disposed; a second region in which the second-second coil **1332** is disposed; a third region in which the second-third coil **1333** is disposed; and a fourth region where the second coil **1330** is not disposed. The terminal unit of the first substrate **1320** may comprise a first terminal unit **1322** being extended from an edge of the fourth region of the body part **1321**. The terminal unit of the first substrate **1320** may comprise a second terminal unit **1323** being extended from an edge of the third region of the body part **1321**. The second-first coil **1331**, the second-second coil **1332**, and the second-third coil **1333** may be referred to as a first coil, a second coil, and a third coil.

An outer side surface of the first terminal unit **1322** may face the second lens driving device **20**. The first terminal unit **1322** may be spaced apart from the second lens driving device **20**. An outer side surface of the second terminal unit **1323** may not face the second lens driving device **20**. The first terminal unit **1322** may be disposed closer to the second lens driving device **20** than the second terminal unit **1323**.

The first base **1310** may comprise a first side surface being disposed at a position corresponding to the first lateral plate **1342-1** of the first cover **1340**. The first terminal unit **1322** may be disposed on a first side surface of the first base **1310**. The first base **1310** may comprise a second side surface being disposed at a position corresponding to the second lateral plate **1342-2** of the first cover **1340**. The second side surface of the first base **1310** may be disposed at an opposite side of the first side surface of the first base **1310**. The second terminal unit **1323** may be disposed on a second side surface of the first base **1310**.

The terminal unit of the first substrate **1320** may comprise a second terminal unit **1323** being disposed at an opposite side of the first terminal unit **1322**. The first terminal unit **1322** and the second terminal unit **1323** may be disposed at an opposite side to each other. The first terminal unit **1322** and the second terminal unit **1323** may be disposed at an opposite side to each other with respect to the first base **1310**. The first terminal unit **1322** and the second terminal unit **1323** may be disposed at an opposite side to each other with respect to an optical axis of the first lens driving device **10**.

The first terminal unit **1322** and the second terminal unit **1323** may be formed to have different sizes. The first terminal unit **1322** and the second terminal unit **1323** may be formed to have different widths. The first terminal unit **1322** and the second terminal unit **1323** may be formed in different shapes. The first terminal unit **1322** and the second terminal unit **1323** may comprise different numbers of terminals. Any one of the first terminal unit **1322** and the second terminal unit **1323** comprises 8 terminals and the other may comprise 7 terminals.

The first terminal unit **1322** and the second terminal unit **1323** may be formed to have the same size. The first terminal unit **1322** and the second terminal unit **1323** may be formed to have the same width. The first terminal unit **1322** and the second terminal unit **1323** may be formed in the same shape. The first terminal unit **1322** and the second terminal unit **1323** may comprise the same number of terminals. Each of the first terminal unit **1322** and the second terminal unit **1323** may comprise eight terminals.

In a second embodiment of the present embodiment, the first lateral plate **2342-1** of the second cover **2340** may be

disposed to face the first lateral plate **1342-1** of the first cover **1340**. The second substrate **2320** may comprise a terminal unit comprising terminals being coupled to the printed circuit board **30**. The terminal unit of the second substrate **2320** may comprise a first terminal unit **2322** being disposed at a position corresponding to the first lateral plate **2342-1** of the second cover **2340**. The terminal unit of the second substrate **2320** may comprise a second terminal unit **2322** being disposed at a position corresponding to the second lateral plate **2342-2** of the second cover **2340**. At this time, the gyro sensor **50** may be disposed closer to the first lens driving device **10** than to the second lens driving device **20**.

The body part **2321** of the second substrate **2320** may comprise: a first region in which the fourth-first coil **2331** is disposed; a second region in which the fourth-second coil **2332** is disposed; a third region in which the fourth-third coil **2333** is disposed; and a fourth region where the fourth coil **2330** is not disposed. The terminal unit of the second substrate **2320** may comprise a first terminal unit **2322** being extended from an edge of the fourth region of the body part **2321**. The terminal unit of the second substrate **2320** may comprise a second terminal unit **2323** being extended from an edge of a third region of the body part **2321**. The fourth-first coil **4331**, fourth-second coil **4332**, and fourth-third coil **4333** may be referred to as a first coil, a second coil, and a third coil.

An outer surface of the first terminal unit **2322** may face the first lens driving device **10**. The first terminal unit **2322** may be spaced apart from the first lens driving device **10**. An outer side surface of the second terminal unit **2323** may not face the first lens driving device **10**. The first terminal unit **2322** may be disposed closer to the first lens driving device **10** than the second terminal unit **2323**.

The second base **2310** may comprise a first side surface being disposed at a position corresponding to the first lateral plate **1342-1** of the second cover **2340**. The first terminal unit **2322** may be disposed on a first side surface of the second base **2310**. The second base **2310** may comprise a second side surface being disposed at a position corresponding to the second lateral plate **1342-2** of the second cover **2340**. The second side surface of the second base **2310** may be disposed at an opposite side of the first side surface of the second base **2310**. The second terminal unit **2323** may be disposed on a second side surface of the second base **2310**.

The terminal unit of the second substrate **2320** may comprise a second terminal unit **2323** being disposed at an opposite side of the first terminal unit **2322**. The first terminal unit **2322** and the second terminal unit **2323** may be disposed at an opposite side to each other. The first terminal unit **2322** and the second terminal unit **2323** may be disposed at an opposite side to each other with respect to the second base **2310**. The first terminal unit **2322** and the second terminal unit **2323** may be disposed at an opposite side to each other with respect to an optical axis of the second lens driving device **20**.

The first terminal unit **2322** and the second terminal unit **2323** may be formed in different sizes. The first terminal unit **2322** and the second terminal unit **2323** may be formed to have different widths. The first terminal unit **2322** and the second terminal unit **2323** may be formed in different shapes. The first terminal unit **2322** and the second terminal unit **2323** may comprise different numbers of terminals. Any one of the first terminal unit **2322** and the second terminal unit **2323** comprises 8 terminals and the other may comprise 7 terminals.

The first terminal unit **2322** and the second terminal unit **2323** may be formed to have the same size. The first terminal unit **2322** and the second terminal unit **2323** may be formed to have the same width. The first terminal unit **2322** and the second terminal unit **2323** may be formed in the same shape. The first terminal unit **2322** and the second terminal unit **2323** may comprise the same number of terminals. Each of the first terminal unit **2322** and the second terminal unit **2323** may comprise eight terminals.

The second substrate **2320** may comprise a first terminal unit **2322** being disposed to face the first terminal unit **1322** of the first substrate **1320**. The second substrate **2320** may comprise a second terminal unit **2323** being disposed at an opposite side of the first terminal unit **2322** of the second substrate **2320**.

Hereinafter, a configuration of a first lens driving device according to a second embodiment of present embodiment will be described with reference to drawings.

FIG. **18** is a perspective view of a part of a camera device according to a second embodiment of the present embodiment; FIG. **19** is a cross-sectional view viewed from A-A in FIG. **2**; FIG. **20** is a cross-sectional view viewed from line B-B in FIG. **2**; FIG. **21** is a cross-sectional view viewed from C-C in FIG. **2**; FIG. **22** is a perspective view of a first lens driving device according to a second embodiment of present embodiment; FIG. **23** is an exploded perspective view of a first lens driving device according to a second embodiment of present embodiment; FIG. **24** is an exploded perspective view of a first mover of a first lens driving device according to a second embodiment of present embodiment; FIG. **25** is an exploded perspective view of a second mover of a first lens driving device according to a second embodiment of present embodiment; FIG. **26** is an exploded perspective view of a stator of a first lens driving device according to a second embodiment of present embodiment; and FIG. **27** is an exploded perspective view of an elastic member and a support member of a first lens driving device according to a second embodiment of the present embodiment.

The camera device **2** may comprise a first lens driving device **10**. The first lens driving device **10** may be a voice coil motor (VCM). The first lens driving device **10** may be a lens driving motor. The first lens driving device **10** may be a lens driving actuator. The first lens driving device **10** may comprise an AF module. The first lens driving device **10** may comprise an OIS module. The first lens driving device **10** may be disposed on the printed circuit board **30**. The first lens driving device **10** may be disposed on a first surface of the printed circuit board **30**. At this time, the first surface may be an upper surface.

The first lens driving device **10** may comprise a first mover **1100**. The first mover **1100** may be coupled to the first lens **41**. The first mover **1100** may be connected to the second mover **1200** through the first elastic member **1410** and/or the second elastic member **1420**. The first mover **1100** may move through interaction with the second mover **1200**. At this time, the first mover **1100** can move integrally with the first lens **41**. Meanwhile, the first mover **1100** may move during AF driving. At this time, the first mover **1100** may be referred to as an 'AF mover'. However, the first mover **1100** can move together with the second mover **1200** even during OIS driving.

The first lens driving device **10** may comprise a first bobbin **1110**. The first mover **1100** may comprise a first bobbin **1110**. The first bobbin **1110** may be disposed inside the first housing **1210**. The first bobbin **1110** may be disposed in the hole **1211** of the first housing **1210**. The first bobbin **1110** may be movably coupled to the first housing

1210. The first bobbin **1110** may move in an optical axis direction against the first housing **1210**. The first lens **41** may be coupled to the first bobbin **1110**. The first bobbin **1110** and the first lens **41** may be coupled by screw-coupling and/or an adhesive. The first coil **1120** may be coupled to the first bobbin **1110**. A first elastic member **1410** may be coupled to an upper portion or an upper surface of the first bobbin **1110**. A second elastic member **1420** may be coupled to a lower portion or a lower surface of the first bobbin **1110**. The first bobbin **1110** may be coupled to the first elastic member **1410** and/or the second elastic member **1420** by thermal fusion and/or an adhesive. The adhesive coupling the first bobbin **1110** and the first lens **41** and the first bobbin **1110** and the elastic member **1400** may be an epoxy being cured by any one or more among ultraviolet (UV), heat and laser.

The first bobbin **1110** may comprise a hole **1111**. The hole **1111** may be hollow. The hole **1111** may penetrate through the first bobbin **1110** in an optical axis direction. The first lens **41** may be accommodated in the hole **1111**. For an example, a screw thread corresponding to a screw thread being formed on an outer circumferential surface of the first lens **41** may be disposed on an inner circumferential surface of the hole **1111** of the first bobbin **1110**.

The first bobbin **1110** may comprise a groove **1112**. The groove **1112** may be a sensing magnet accommodating groove. The groove **1112** may be a recess. A sensing magnet **1130** may be disposed in the groove **1112**. The groove **1112** of the first bobbin **1110** may be formed on an outer circumferential surface of the first bobbin **1110**. At least a portion of the groove **1112** of the first bobbin **1110** may be formed to correspond to the shape and size of the sensing magnet **1130**. The groove **1112** may open downward.

The first bobbin **1110** may comprise a protrusion **1113**. A first coil **1120** may be disposed at the protrusion **1113**. The protrusion **1113** may be formed on an outer circumferential surface of the first bobbin **1110**. The protrusion **1113** may be protruded from an outer circumferential surface of the first bobbin **1110**. The first coil **1120** may be wound and fixed to the protrusion **1113**.

The first bobbin **1110** may comprise a lower stopper **1114**. A downward stroke of the first bobbin **1110** may be restricted through the lower stopper **1114**. The lower stopper **1114** may be formed on an outer circumferential surface of the first bobbin **1110**. The lower stopper **1114** may be in contact with the first housing **1210** when the first bobbin **1110** moves downward.

The first lens driving device **10** may comprise a first coil **1120**. The first mover **1100** may comprise a first coil **1120**. The first coil **1120** may be an 'AF driving coil' used for AF driving. The first coil **1120** may be disposed in the first bobbin **1110**. The first coil **1120** may move the first bobbin **1110**. The first coil **1120** may be disposed between the first bobbin **1110** and the first housing **1210**. The first coil **1120** may be disposed on an outer lateral surface or an outer circumferential surface of the first bobbin **1110**. The first coil **1120** may be directly wound around the first bobbin **1110**. Or, the first coil **1120** may be coupled to the first bobbin **1110** in a directly wound state. The first coil **1120** may face the first magnet **1220**. The first coil **1120** may be disposed to face the first magnet **1220**. The first coil **1120** may interact with the first magnet **1220** electromagnetically. In this case, when a current is supplied to the first coil **1120** and an electromagnetic field is formed around the first coil **1120**, the first coil **1120** may move against the first magnet **1220** by the electromagnetic interaction between the first coil **1120** and the first magnet **1220**.

The first coil **1120** may comprise a plurality of coils. The first coil **1120** may comprise two coils. The first coil **1120** may comprise a first-first and first-second coils **1121** and **1122**. The first-first coil **1121** may be disposed at a position corresponding to the third lateral plate **1342-3** of the first cover **1340**. The first-first coil **1121** may be disposed to face the third lateral plate **1342-3** of the first cover **1340**. The first-second coil **1122** may be disposed at a position corresponding to the fourth lateral plate **1342-4** of the first cover **1340**. The first-second coil **1122** may be disposed to face the fourth lateral plate **1342-4** of the first cover **1340**.

In the second embodiment of the present embodiment, the first coil **1120** and the first magnet **1220** may move the first bobbin **1110** against first housing **1210** in an optical axis direction. The first coil **1120** and the first magnet **1220** may move the first bobbin **1110** in an optical axis direction through electromagnetic interaction. The first coil **1120** and the first magnet **1220** may be used for AF driving.

The first lens driving device **10** may comprise a coil. The coil may move the first bobbin **1110**. The coil may comprise a first coil **1120** that moves the first bobbin **1110** in an optical axis direction and a second coil **1330** that moves the first bobbin **1110** in a direction perpendicular to the optical axis direction.

The first lens driving device **10** may comprise a sensing magnet **1130**. The first mover **1100** may comprise a sensing magnet **1130**. The sensing magnet **1130** may be disposed in the first bobbin **1110**. The sensing magnet **1130** may be detected through the first sensor **1610**. In addition, the first lens driving device **10** may comprise a compensation magnet. The first mover **1100** may comprise a compensation magnet. The compensation magnet may be disposed to achieve magnetic force balance with the sensing magnet **1130**. The compensation magnet may have a weight corresponding to that of the sensing magnet **1130**. The compensation magnet may be disposed symmetrically with the sensing magnet **1130** with respect to an optical axis.

The first lens driving device **10** may comprise a second mover **1200**. The second mover **1200** may be movably coupled to the stator **1300** through the support member **1500**. The second mover **1200** may support the first mover **1100** through the first and second elastic members **1410** and **1420**. The second mover **1200** may move the first mover **1100** or may move together with the first mover **1100**. The second mover **1200** may move through interaction with the stator **1300**. The second mover **1200** may move during OIS driving. At this time, the second mover **1200** may be referred to as an 'OIS mover'. The second mover **1200** may move integrally with the first mover **1100** during OIS driving.

The first lens driving device **10** may comprise a first housing **1210**. The second mover **1200** may comprise a first housing **1210**. The first housing **1210** may be spaced apart from the first base **1310**. The first housing **1210** may be disposed outside the first bobbin **1110**. The first housing **1210** may accommodate at least a portion of the first bobbin **1110**. The first housing **1210** may be disposed inside the first cover **1340**. The first housing **1210** may be disposed between the first cover **1340** and the first bobbin **1110**. The first housing **1210** may be formed of a material different from that of the first cover **1340**. The first housing **1210** may be formed of an insulating material. The first housing **1210** may be formed of an injection-molded material. An outer side surface of the first housing **1210** may be spaced apart from an inner surface of the lateral plate **1342** of the first cover **1340**. The first housing **1210** may move for OIS driving through the separation space between the first housing **1210** and the first cover **1340**. A first magnet **1220** may

be disposed in the first housing **1210**. The first housing **1210** and the first magnet **1220** may be coupled by an adhesive. A first elastic member **1410** may be coupled to an upper portion or an upper surface of the first housing **1210**. A second elastic member **1420** may be coupled to a lower portion or lower surface of the first housing **1210**. The first housing **1210** may be coupled to an upper portion and the second elastic members **1410** and **1420** by thermal fusion and/or an adhesive. The adhesive that couples the first housing **1210** and the first magnet **1220** and the first housing **1210** and the elastic member **1400** may be an epoxy cured by any one or more among ultraviolet (UV), heat and laser.

The first housing **1210** may comprise four side portions and four corner portions being disposed between the four side portions. The side portion of the first housing **1210** may comprise: a first side portion; a second side portion being disposed at an opposite side of the first side portion; a third side portion and a fourth side portion being disposed at an opposite side to each other between the first side portion and the second side portion. The corner portion of the first housing **1210** may comprise: a first corner portion being disposed between a first side portion and a third side portion; a second corner portion being disposed between a first side portion and a fourth side portion; a third corner portion being disposed between a second side portion and a third side portion; and a fourth corner portion being disposed between a second side portion and a fourth side portion. The side portion of the first housing **1210** may comprise a 'lateral wall'. The first side portion of the first housing **1210** may be disposed at a position corresponding to the first lateral plate **1342-1** of the first cover **1340**. The second side portion of the first housing **1210** may be disposed at a position corresponding to the second lateral plate **1342-2** of the first cover **1340**. The third side portion of the first housing **1210** may be disposed at a position corresponding to the third lateral plate **1342-3** of the first cover **1340**. The fourth side portion of the first housing **1210** may be disposed at a position corresponding to the fourth lateral plate **1342-4** of the first cover **1340**.

The first housing **1210** may comprise a hole **1211**. The hole **1211** may be hollow. The hole **1211** may be formed in the first housing **1210**. The hole **1211** may be formed to penetrate through the first housing **1210** in an optical axis direction. A first bobbin **1110** may be disposed in the hole **1211**. At least a portion of the hole **1211** may be formed in a shape corresponding to that of the first bobbin **1110**. An inner circumferential surface or an inner lateral surface of the first housing **1210** forming the hole **1211** may be spaced apart from an outer circumferential surface of the first bobbin **1110**. However, at least a portion of the first housing **1210** and the first bobbin **1110** be overlapped in an optical axis direction, so that the moving stroke distance of the first bobbin **1110** in an optical axis direction may be restricted.

The first housing **1210** may comprise a groove **1212**. The groove **1212** may accommodate at least a portion of the lower stopper **1114** of the first bobbin **1110**. The bottom surface of the groove **1212** may be overlapped with the lower stopper **1114** of the first bobbin **1110** in an optical axis direction. When the first bobbin **1110** moves downward, the lower stopper **1114** of the first bobbin **1110** may come into contact with the bottom surface of the groove **1212** of the first housing **1210**.

The first housing **1210** may comprise a hole **1213**. The hole **1213** may be a magnet accommodating groove. A first magnet **1220** may be coupled to the groove **1213**. The groove **1213** may be formed as a portion of an inner circumferential surface and/or a lower surface of the first housing **1210** is being recessed. The groove **1213** may be

formed in each of the three side portions of the first housing 1210. The groove 1213 may be formed in a second, third, and fourth side portions of the first housing 1210. The groove 1213 may be formed in a shape corresponding to the first side portion of the first housing 1210, but a dummy member 1230 other than the first magnet 1220 may be disposed in the groove 1213 being formed in a first side portion of the first housing 1210.

The first housing 1210 may comprise a hole 1214. The hole 1214 may be a support member through hole. The hole 1214 may be formed in a corner portion of the first housing 1210. The hole 1214 may be formed to penetrate through the first housing 1210 in an optical axis direction. A support member 1500 may be disposed in the hole 1214 of the first housing 1210. The support member 1500 may pass through the hole 1214 of the first housing 1210.

The first lens driving device 10 may comprise a first magnet 1220. The second mover 1200 may comprise a first magnet 1220. The first magnet 1220 may be disposed in the first housing 1210. The first magnet 1220 may be disposed inside the first cover 1340. The first magnet 1220 may be fixed to the first housing 1210 by an adhesive. The first magnet 1220 may be disposed between the first bobbin 1110 and the first housing 1210. The first magnet 1220 may face the first coil 1120. The first magnet 1220 may interact with the first coil 1120 electromagnetically. The first magnet 1220 may move the first bobbin 1110 in an optical axis direction through interaction with the first coil 1120. The first magnet 1220 may be used for AF driving. The first magnet 1220 may face the second coil 1330. The first magnet 1220 may interact with the second coil 1330 electromagnetically. The first magnet 1220 may move the first bobbin 1110 and the first housing 1210 in a direction perpendicular to the optical axis direction through interaction with the second coil 1330. The first magnet 1220 may be used for OIS driving. The first magnet 1220 may be disposed in a plurality of side portions of the first housing 1210. The first magnet 1220 may be a flat magnet having a flat plate shape.

The first magnet 1220 may not be disposed between the first bobbin 1110 and the first lateral plate 1342-1 of the first cover 1340. Through this, magnetic field interference of the first magnet 1220 affecting the second lens driving device 20 can be minimized.

The first magnet 1220 may comprise a plurality of magnets. The first magnet 1220 may comprise three magnets. The first magnet 1220 may comprise first-first to first-third magnets 1221, 1222, and 1223. The first-first magnet 1221 may be disposed in a third side portion of the first housing 1210. The first-second magnet 1221 may be disposed in a fourth side portion of the first housing 1210. The first to third magnets 1221 may be disposed in a second side portion of the first housing 1210. A dummy member 1230 may be disposed in a first side portion of the first housing 1210.

The first-first magnet 1221 may face the first-first coil 1121. The first-second magnet 1222 may face the first-second coil 1122. The first-first and first-second magnets 1221 and 1222 may be used during AF driving. The first magnet 1220 comprises a first-first magnet 1221 being disposed at a position corresponding to the third lateral plate 1342-3 of the first cover 1340 and the fourth lateral plate 1342-4. The first-second magnet 1222 being disposed at a corresponding position and first to third magnets 1223 being disposed at a position corresponding to the second lateral plate 1342-2 may be comprised.

The first-first magnet 1221 may face the second-first coil 1331. The first-second magnet 1222 may face the second-second coil 1332. The first-first and first-second magnets

1221 and 1222 may be used when driving in an OIS-x-axis direction. The first-third magnet 1223 may face the second-third coil 1333. The first-third magnet 1223 may be used when driving in an OIS-y-axis direction. The area of the lower surface of the first-third magnet 1223 may be larger than the area of the lower surface of each of the first-first magnet 1221 and the first-second magnet 1222.

The first-first magnet 1221 and the first-second magnet 1222 may be 4-pole magnetized magnets. The first-first magnet 1221 and the first-second magnet 1222 may be 4-pole magnets. The 4-pole magnetized magnet may comprise a neutral portion being disposed horizontally in the central portion. Here, the neutral portion may be a void. The first-first magnet 1221 and the first-second magnet 1222 may be 2-pole magnetized. As the first-first magnet 1221 and the first-second magnet 1222 are 2-pole magnetized, the AF electromagnetic force can be maximized. Each of the first-first magnet 1221 and the first-second magnet 1222 may be a 4-pole magnet in which the polarity of the upper portion of the inner surface is different from that of the lower portion of the inner surface and the upper portion of the outer surface, and the polarity of the lower portion of the outer surface is the same.

The first-third magnet 1223 may be a 2-pole magnetized magnet. The first-third magnet 1223 may be a 2-pole magnet. The first-third magnet 1223 may be a 2-pole magnet in which the polarities of the inner surface and the outer surface are different. For example, the inner surface of the first-third magnet 1223 may be an N pole and the outer surface of the first-third magnet 1223 may be an S pole. Conversely, the inner surface of the first-third magnet 1223 may be an S pole and the outer surface of the first-third magnet 1223 may be an N pole. However, as a modified embodiment, the first-third magnet 1223 may be a 4-pole magnet. The first-third magnet 1223 may be formed larger than each of the first-first magnet 1221 and the first-second magnet 1222.

The first lens driving device 10 may comprise a dummy member 1230. The second mover 1200 may comprise a dummy member 1230. The dummy member 1230 may be disposed in the first housing 1210. The dummy member 1230 may be disposed in the first side portion of the first housing 1210. The dummy member 1230 may be disposed adjacent to the second lens driving device 20. Through this, magnetic force interference between the first lens driving device 10 and the second lens driving device 20 can be minimized. The dummy member 1230 may be disposed at a position corresponding to the first lateral plate 1342-1 of the first cover 1340.

The dummy member 1230 may have a weight corresponding to that of the first-third magnet 1223. The dummy member 1230 may have weaker magnetic force than the first-third magnet 1223 or may not have magnetic force. The dummy member 1230 may be disposed at an opposite side of the first-third magnet 1223 in the first housing 1210. The weight of the dummy member 1230 may correspond to the weight of the first-third magnet 1223. However, the dummy member 1230 may have a weight lighter than that of the first-third magnet 1223. Or, the dummy member 1230 may have a weight heavier than that of the first-third magnet 1223. The dummy member 1230 may be within 80% of the weight of the first-third magnet 1223 to 120% of the weight of the first-third magnet 1223. If the weight of the dummy member 1230 is less than the lower limit or exceeds the upper limit of the above-mentioned value, the weight balancing of the OIS driving unit may collapse.

The dummy member 1230 may be a non-magnetic material. The dummy member 1230 may comprise a non-mag-

netic material. The magnetic strength of the dummy member **1230** may be weaker than that of the first-third magnet **1223**. The dummy member **1230** may be disposed at an opposite side of the first-third magnet **1223** to align the center of gravity. The dummy member **1230** may be made of 95% or more of tungsten. That is, the dummy member **1230** may be a tungsten alloy. For example, the specific gravity of the dummy member **1230** may be 18000 or more. The dummy member **1230** may be disposed at a position symmetrical to the first-third magnet **1223** with respect to the central axis of the first housing **1210**. At this time, the central axis of the first housing **1210** may correspond to an optical axis. The dummy member **1230** may have a thickness corresponding to that of the first-third magnet **1223** in a direction perpendicular to the optical axis.

The first lens driving device **10** may comprise a yoke **1240**. The second mover **1200** may comprise a yoke **1240**. The yoke **1240** may be disposed in the first housing **1210**. The yoke **1240** may be disposed in a first side portion of the first housing **1210**. The yoke **1240** may be disposed adjacent to the second lens driving device **20**. Through this, magnetic force interference between the first lens driving device **10** and the second lens driving device **20** can be minimized.

The first lens driving device **10** may comprise a stator **1300**. The stator **1300** may be disposed below the first and second movers **1100** and **1200**. The stator **1300** may movably support the second mover **1200**. The stator **1300** may move the second mover **1200**. At this time, the first mover **1100** can also move together with the second mover **1200**.

The first lens driving device **10** may comprise a first base **1310**. The stator **1300** may comprise a first base **1310**. The first base **1310** may be disposed below the first housing **1210**. The first base **1310** may be disposed below the first substrate **1320**. The first substrate **1320** may be disposed on an upper surface of the first base **1310**. The first base **1310** may be coupled to the first cover **1340**. The first base **1310** may be disposed on the printed circuit board **30**.

The first base **1310** may comprise a step **1311**. The step **1311** may be formed on a side surface of the first base **1310**. The step **1311** may be formed around an outer circumferential surface of the first base **1310**. The step **1311** may be formed as a portion of the side surface of the first base **1310** is being protruded or recessed. A lower end of the lateral plate **1342** of the first cover **1340** may be disposed at the step **1311**.

The first base **1310** may comprise a hole **1312**. The hole **1312** may be hollow. The hole **1312** may penetrate through the first base **1310** in an optical axis direction. A light passing through the first lens **41** through the hole **1312** may be incident to an image sensor.

The first base **1310** may comprise a protrusion **1313**. The protrusion **1313** may be formed on an upper surface of the first base **1310**. The protrusion **1313** may be protruded from an upper surface of the first base **1310**. A second coil **1330** may be disposed in the protrusion **1313**. The second coil **1330** may be wound around the protrusion **1313** and disposed.

The first lens driving device **10** may comprise a first substrate **1320**. The stator **1300** may comprise a first substrate **1320**. The first substrate **1320** may be disposed in the first base **1310**. The first substrate **1320** may be disposed at one side of the first housing **1210**. The first substrate **1320** may be disposed between the first base **1310** and the first housing **1210**. The first substrate **1320** may be disposed on an upper surface of the first base **1310**. The support member **1500** may be coupled to the first substrate **1320**. The first substrate **1320** may be electrically connected to the support

member **1500**. One end of the support member **1500** may be fixed to the first substrate **1320**. The first substrate **1320** may be coupled to the printed circuit board **30** being disposed below the first base **1310** by soldering. The first substrate **1320** may comprise a flexible printed circuit board (FPCB). The first substrate **1320** may be partially bent.

The first substrate **1320** may comprise a body part **1321**. A hole may be formed in the body part **1321**. The hole may be hollow penetrating the first substrate **1320** in an optical axis direction. The first substrate **1320** may comprise a hole. A support member **1500** may be disposed in the hole of the first substrate **1320**. The support member **1500** may be disposed to pass through the hole of the first substrate **1320**.

The first substrate **1320** may comprise a terminal unit. The terminal unit may be extended from an edge of the body part **1321**. The terminal unit may comprise a terminal electrically connected to the printed circuit board **30**. The terminal unit may comprise a terminal being coupled to the printed circuit board **30**. The terminal unit may comprise a plurality of terminal units.

The first substrate **1320** may comprise a first terminal unit **1322**. The first terminal unit **1322** may be extended downward from the body part **1321** of the first substrate **1320**. The first terminal unit **1322** may be formed by bending a part of the first substrate **1320**. At least a portion of the first terminal unit **1322** may be exposed to the outside. The first terminal unit **1322** may be coupled to the printed circuit board **30** being disposed below the first base **1310** by soldering. The first terminal unit **1322** may be disposed in a groove of the first base **1310**. The first terminal unit **1322** may comprise a plurality of terminals.

The first substrate **1320** may comprise a first terminal unit **1322** and a plurality of terminals being disposed on the first terminal unit **1322** and electrically connected to the printed circuit board **30**. The first terminal unit **1322** of the first substrate **1320** may be disposed at a position corresponding to the first lateral plate **1342-1** of the first cover **1340**. The first terminal unit **1322** of the first substrate **1320** may be disposed closest to the first lateral plate **1342-1** among the first to fourth lateral plates **1342-1**, **1342-2**, **1342-3**, and **1342-4** of the first cover **1340**.

The first substrate **1320** may comprise a second terminal unit **1323**. The second terminal unit **1323** may be disposed at an opposite side of the first terminal unit **1322**. The second terminal unit **1323** of the first substrate **1320** may be disposed at a position corresponding to the second lateral plate **1342-2** of the first cover **1340**.

The first lens driving device **10** may comprise a second coil **1330**. The stator **1300** may comprise a second coil **1330**. The second coil **1330** may be an 'OIS coil'. The second coil **1330** may move the first bobbin **1110**. The second coil **1330** may be disposed in the first base **1310**. The second coil **1330** may be disposed in the first substrate **1320**. The second coil **1330** may face the first magnet **1220**. The second coil **1330** may interact with the first magnet **1220** electromagnetically. In this case, when a current is supplied to the second coil **1330** and a magnetic field is formed around the second coil **1330**, the first magnet **1220** may move against the second coil **1330** by the electromagnetic interaction between the second coil **1330** and the first magnet **1220**. The second coil **1330** may move the first housing **1210** and the first bobbin **1110** against the first base **1310** in a direction perpendicular to the optical axis through electromagnetic interaction with the first magnet **1220**. The first substrate **1320** may comprise a second coil **1330**. That is, the second coil **1330** may be one configuration of the first substrate **1320**. The second coil

1330 may be formed as a fine pattern coil (FP coil) in a substrate separate from the first substrate **1320**.

The second coil **1330** may comprise a plurality of coils. The second coil **1330** may comprise a number of coils corresponding to those of the first magnet **1220**. The second coil **1330** may comprise three coils. The second coil **1330** may comprise a second-first coil **1331**, a second-second coil **1332**, and a second-third coil **1333**. The second-first coil **1331** may face the first-first magnet **1221**. The second-second coil **1332** may face the first-second magnet **1222**. The second-third coil **1333** may face the first-third magnet **1223**.

The number of windings of the second-first coil **1331** may be greater than the number of windings of the second-second coil **1332** and the second-third coil **1333**. The number of windings of the second-second coil **1332** may correspond to the number of windings of the second-third coil **1333**. In a second embodiment of the present embodiment, during OIS driving, the movement in an X-axis direction is performed through the second-first coil **1331** and second-second coil **1332**, and the movement in a Y-axis direction may be performed through the second-third coil **1333**. Therefore, in a second embodiment of the present embodiment, the number of turns of the second-third coil **1333** may be higher than the number of turns of the second-first coil **1331** and the second-second coil **1332** to compensate for insufficient driving force in a Y-axis direction. For example, a ratio between the number of turns of the second-third coil **1333** and the number of turns of the second-first and second-second coils **1331** and **1332** may be 1.5:2.0 to 1:1. Ideally, the ratio of the number of turns of the second-third coil **1333** to the number of turns of the second-first and second-second coils **1331** and **1332** is 1:1, but it can be disposed up to 1.5:2.0 due to space constraints.

The first lens driving device **10** may comprise a first cover **1340**. The stator **1300** may comprise a first cover **1340**. The first cover **1340** may comprise a 'cover can'. The first cover **1340** may comprise a yoke. The first cover **1340** may be disposed outside the first housing **1210**. The first cover **1340** may be coupled to the first base **1310**. The first cover **1340** may accommodate the first housing **1210** therein. The first cover **1340** may form the outer appearance of the first lens driving device **10**. The first cover **1340** may have a hexahedral shape with an open lower surface. The first cover **1340** may be made of a non-magnetic material. The first cover **1340** may be formed of a metal material. The first cover **1340** may be formed of a metal plate. The first cover **1340** may be connected to the ground portion of the printed circuit board **30**. Through this, the first cover **1340** may be grounded. The first cover **1340** may block electromagnetic interference (EMI). At this time, the first cover **1340** may be referred to as an 'EMI shield can'.

The first cover **1340** may comprise an upper plate **1341** and a lateral plate **1342**. The first cover **1340** may comprise an upper plate **1341** comprising a hole and a lateral plate **1342** being extended downward from an outer circumference or edge of the upper plate **1341**. The lower end of the lateral plate **1342** of the first cover **1340** may be disposed in the step **1311** of the first base **1310**. An inner surface of the lateral plate **1342** of the first cover **1340** may be fixed to the first base **1310** by an adhesive.

The lateral plate **1342** of the first cover **1340** may comprise a plurality of lateral plates. The lateral plate **1342** may comprise four lateral plates. The lateral plate **1342** of the first cover **1340** may comprise: a first lateral plate **1342-1** and a second lateral plate **1342-2** being disposed at an opposite side to each other; and a third lateral plate **1342-3** and a

fourth lateral plate **1342-4** being disposed at an opposite side to each other. The gyro sensor **50** may be disposed closest to the fourth lateral plate **1342-4** among the first to fourth lateral plates **1342-1**, **1342-2**, **1342-3**, and **1342-4**. The first terminal unit **1322** of the first substrate **1320** may be disposed at a position corresponding to the first lateral plate **1342-1** of the first cover **1340**. The second terminal unit **1323** of the first substrate **1320** may be disposed at a position corresponding to the second lateral plate **1342-2** of the first cover **1340**.

The first cover **1340** may comprise a groove **1343**. The groove **1343** may be formed in the lateral plate **1342** of the first cover **1340**. The groove **1343** may be formed at a lower end of the lateral plate **1342**. The groove **1343** may be formed at a position corresponding to at least one of the first terminal unit **1322** and the second terminal unit **1323**. The groove **1343** may be formed to expose at least one of the first terminal unit **1322** and the second terminal unit **1323** to the outside.

The first lens driving device **10** may comprise a terminal **1350**. The stator **1300** may comprise a terminal **1350**. The terminal **1350** may be disposed in the first base **1310**. The terminal **1350** may be electrically connected to the first substrate **1320**. The terminal **1350** may be coupled to the support member **1500**. The terminal **1350** may electrically connect the support member **1500** and the first substrate **1320**.

The first lens driving device **10** may comprise an elastic member **1400**. The elastic member **1400** may be an 'AF support member'. At least portion of the elastic member **1400** may have elasticity. The elastic member **1400** may be formed of metal. The elastic member **1400** may be formed of a conductive material. The elastic member **1400** may connect the first bobbin **1110** and the first housing **1210**. The elastic member **1400** may elastically connect the first bobbin **1110** and the first housing **1210**. The elastic member **1400** may be coupled to the first bobbin **1110** and the first housing **1210**. The elastic member **1400** may elastically support the first bobbin **1110**. The elastic member **1400** may movably support the first bobbin **1110**. The elastic member **1400** may support the movement of the first bobbin **1110** during AF driving.

The elastic member **1400** may comprise a first elastic member **1410**. The first elastic member **1410** may be an 'upper elastic member'. The first elastic member **1410** may connect the first housing **1210** and the first bobbin **1110**. The first elastic member **1410** may be coupled to an upper portion of the first bobbin **1110** and an upper portion of the first housing **1210**. The first elastic member **1410** may be coupled to an upper surface of the first bobbin **1110**. The first elastic member **1410** may be coupled to an upper surface of the first housing **1210**. The first elastic member **1410** may be coupled to the support member **1500**. The first elastic member **1410** may be formed of a leaf spring. The first elastic member **1410** can be separated and used as a power line for electrical or communication signal.

The first elastic member **1410** may comprise a plurality of elastic units. The first elastic member **1410** may comprise three elastic units. The first elastic member **1410** may comprise first to third elastic units **1410-1**, **1410-2**, and **1410-3**. The first elastic unit **1410-1** may connect the support member **1500** and one end of the first-first coil **1121**. The second elastic unit **1410-2** may connect the other end of the first-first coil **1121** and one end of the first-second coil **1122**. The third elastic unit **1410-3** may connect the other end of the first-second coil **1122** and the support member **1500**. The first elastic member **1410** may be electrically connected to

the first coil **1120**. The first elastic member **1410** may electrically connect the first coil **1120** and the support member **1500**.

The first elastic member **1410** may comprise an outer side portion **1411**. The outer side portion **1411** may be coupled to the first housing **1210**. The outer side portion **1411** may be coupled to an upper surface of the first housing **1210**. The outer side portion **1411** may comprise a hole or groove being coupled to the protrusion of the first housing **1210**. The outer side portion **1411** may be fixed to the first housing **1210** by an adhesive.

The first elastic member **1410** may comprise an inner side portion **1412**. The inner side portion **1412** may be coupled to the first bobbin **1110**. The inner side portion **1412** may be coupled to an upper surface of the first bobbin **1110**. The inner side portion **1412** may comprise a hole or groove being coupled to the protrusion of the first bobbin **1110**. The inner side portion **1412** may be fixed to the first bobbin **1110** by an adhesive.

The first elastic member **1410** may comprise a connecting portion **1413**. The connecting portion **1413** may connect the inner side portion **1412** and the outer side portion **1411**. The connecting portion **1413** may have elasticity. At this time, the connecting portion **1413** may be referred to as an 'elastic portion'. The connecting portion **1413** may comprise a shape bent two or more times.

The first elastic member **1410** may comprise a connecting portion **1414**. The connecting portion **1414** may be extended from the outer side portion **1411**. The connecting portion **1414** may be coupled to the support member **1500**. The connecting portion **1414** and the support member **1500** may be coupled by soldering.

The elastic member **1400** may comprise a second elastic member **1420**. The second elastic member **1420** may be a 'lower elastic member'. The second elastic member **1420** may be disposed below the first elastic member **1410**. The second elastic member **1420** may be disposed at one side of the first elastic member **1410**. The second elastic member **1420** may connect the first housing **1210** and the first bobbin **1110**. The second elastic member **1420** may be disposed below the first bobbin **1110**. The second elastic member **1420** may be coupled to the first bobbin **1110** and the first housing **1210**. The second elastic member **1420** may be coupled to a lower surface of the first bobbin **1110**. The second elastic member **1420** may be coupled to a lower surface of the first housing **1210**. The second elastic member **1420** may be formed of a leaf spring. The second elastic member **1420** may be integrally formed.

The second elastic member **1420** may comprise an outer side portion **1421**. The outer side portion **1421** may be coupled to the first housing **1210**. The outer side portion **1421** may be coupled to a lower surface of the first housing **1210**. The outer side portion **1421** may comprise a hole or groove being coupled to the protrusion of the first housing **1210**. The outer side portion **1421** may be fixed to the first housing **1210** by an adhesive.

The second elastic member **1420** may comprise an inner side portion **1422**. The inner side portion **1422** may be coupled to the first bobbin **1110**. The inner side portion **1422** may be coupled to a lower surface of the first bobbin **1110**. The inner side portion **1422** may comprise a hole or groove being coupled to a protrusion of the first bobbin **1110**. The inner side portion **1422** may be fixed to the first bobbin **1110** by an adhesive.

The second elastic member **1420** may comprise a connecting portion **1423**. The connecting portion **1423** may connect the inner side portion **1422** and the outer side

portion **1421**. The connecting portion **1423** may have elasticity. At this time, the connecting portion **1423** may be referred to as an 'elastic portion'. The connecting portion **1423** may comprise a shape bent two or more times.

The first lens driving device **10** may comprise a support member **1500**. The support member **1500** may be an 'OIS support member'. The support member **1500** may connect the first elastic member **1410** and the first substrate **1320** or the first elastic member **1410** and the terminal **1350**. The support member **1500** may be coupled to an upper surface of the first elastic member **1410** and the terminal **1350**. The support member **1500** may movably support the first housing **1210**. The support member **1500** may elastically support the first housing **1210**. At least a portion of the support member **1500** may have elasticity. The support member **1500** may elastically support the movement of the first housing **1210** and the first bobbin **1110** during OIS driving. One end of the support member **1500** may be coupled to the first elastic member **1410** by soldering. The other end of the support member **1500** may be coupled to the terminal **1350** by soldering.

The support member **1500** may comprise a plurality of wires. The support member **1500** may comprise four wires. The plurality of wires may comprise four wires connecting the three first elastic units **410-1**, **410-2**, and **410-3** and the first substrate **1320**. As a modified embodiment, the support member **1500** may be formed as a leaf spring.

The first lens driving device **10** may comprise a first sensor **1610**. The first sensor **1610** may be disposed in the first base **1310**. The first sensor **1610** may detect the sensing magnet **1130**. The first sensor **1610** may be disposed in the first substrate **1320**. The first sensor **1610** may be coupled to a lower surface of the first substrate **1320**. The first sensor **1610** may be spaced apart from the first housing **1210**. The first sensor **1610** may be spaced apart from the first bobbin **1110**. The first sensor **1610** may be overlapped with the sensing magnet **1130** in an optical axis direction. The first sensor **1610** may detect the position of the sensing magnet **1130** for AF feedback control. The first sensor **1610** may be a Hall IC, a Hall element, or a Hall sensor. The first sensor **1610** may detect the magnetic force of the sensing magnet **1130**.

The first lens driving device **10** may comprise a second sensor **1620**. The second sensor **1620** may be disposed between the first base **1310** and the first substrate **1320**. The second sensor **1620** may detect the movement of the second mover **1300**. The second sensor **1620** may detect the movement of the first housing **1210** and the first magnet **1220** by detecting the magnetic force of the first magnet **1220**. The detected value detected by the second sensor **1620** may be used for OIS feedback control. The second sensor **1620** may comprise a plurality of Hall sensors. The second sensor **1620** may comprise two Hall sensors. The second sensor **1620** may comprise a first Hall sensor for detecting the movement in an x-axis direction in the horizontal direction and a second Hall sensor for detecting the movement in a y-axis direction in the horizontal direction.

The first lens driving device **10** may comprise a damper. The damper may be disposed in the support member **1500**. The damper may be disposed in the support member **1500** and the first housing **1210**. The damper may be disposed in the elastic member. The damper may be disposed in the elastic member **1400** and/or the support member **1500** to prevent a resonance phenomenon generated in the elastic member **1400** and/or the support member **1500**.

Hereinafter, a configuration of a second lens driving device according to a second embodiment of present embodiment will be described with reference to drawings.

FIG. 28 is a perspective view of a second lens driving device according to a second embodiment of present embodiment; FIG. 29 is an exploded perspective view of a second lens driving device according to a second embodiment of present embodiment; FIG. 30 is an exploded perspective view of a first mover of a second lens driving device according to a second embodiment of present embodiment; FIG. 31 is an exploded perspective view of a second mover of a second lens driving device according to a second embodiment of present embodiment; FIG. 32 is an exploded perspective view of a stator of a second lens driving device according to a second embodiment of present embodiment; and FIG. 33 is an exploded perspective view of an elastic member and a support member of a second lens driving device according to a second embodiment of the present embodiment.

The camera device 2 may comprise a second lens driving device 20. The second lens driving device 20 may be a voice coil motor (VCM). The second lens driving device 20 may be a lens driving motor. The second lens driving device 20 may be a lens driving actuator. The second lens driving device 20 may comprise an AF module. The second lens driving device 20 may comprise an OIS module. The second lens driving device 20 may be disposed on a printed circuit board 30. The second lens driving device 20 may be disposed on a first surface of printed circuit board 30. At this time, the first surface may be an upper surface.

The second lens driving device 20 may comprise a first mover 2100. The first mover 2100 may be coupled to the second lens 42. The first mover 2100 may be connected to the second mover 2200 through the first elastic member 2410 and/or the second elastic member 2420. The first mover 2100 may move through interaction with the second mover 2200. At this time, the first mover 2100 can move integrally with the second lens 42. Meanwhile, the first mover 2100 may move during AF driving. At this time, the first mover 2100 may be referred to as an 'AF mover'. However, the first mover 2100 may move together with the second mover even during OIS driving.

The second lens driving device 20 may comprise a second bobbin 2110. The first mover 2100 may comprise a second bobbin 2110. A second bobbin 2110 may be disposed inside the second housing 2210. The second bobbin 2110 may be disposed in a hole 2211 in the second housing 2210. The second bobbin 2110 may be movably coupled to the second housing 2210. The second bobbin 2110 is movable against the second housing 2210 in an optical axis direction. A second lens 42 may be coupled to the second bobbin 2110. The second bobbin 2110 and the second lens 42 may be coupled by screw-coupling and/or an adhesive. A third coil 2120 may be coupled to the second bobbin 2110. A first elastic member 2410 may be coupled to an upper portion or upper surface of the second bobbin 2110. A second elastic member 2420 may be coupled to a lower portion or lower surface of the second bobbin 2110. The second bobbin 2110 may be coupled to the first elastic member 2410 and/or the second elastic member 2420 by thermal fusion and/or an adhesive. The adhesive for coupling the second bobbin 2110 and the second lens 42 and the second bobbin 2110 and the elastic member 2400 may be an epoxy cured by at least one among ultraviolet (UV) light, heat, and laser.

The second bobbin 2110 may comprise a hole 2111. The hole 2111 may be hollow. The hole 2111 may penetrate through the second bobbin 2110 in an optical axis direction.

The second lens 42 may be accommodated in the hole 2111. For example, a screw thread corresponding to a screw thread being formed on an outer circumferential surface of the second lens 42 may be disposed on an inner circumferential surface of the hole 2111 of the second bobbin 2110.

The second bobbin 2110 may comprise a groove 2112. The groove 2112 may be a sensing magnet accommodating groove. The groove 2112 may be a recess. A sensing magnet 2130 may be disposed in the groove 2112. The groove 2112 of the second bobbin 2110 may be formed on an outer circumferential surface of the second bobbin 2110. At least a portion of the groove 2112 of the second bobbin 2110 may be formed to correspond to the shape and size of the sensing magnet 2130. The groove 2112 may be open downward.

The second bobbin 2110 may comprise a protrusion 2113. A third coil 2120 may be disposed in the protrusion 2113. The protrusion 2113 may be formed on an outer circumferential surface of the second bobbin 2110. The protrusion 2113 may be protruded from the outer circumferential surface of the second bobbin 2110. A third coil 2120 may be wound and fixed to the protrusion 2113.

The second bobbin 2110 may comprise a lower stopper 2114. A downward stroke of the second bobbin 2110 may be restricted through the lower stopper 2114. The lower stopper 2114 may be formed on an outer circumferential surface of the second bobbin 2110. The lower stopper 2114 may be in contact with the second housing 2210 when the second bobbin 2110 moves downward.

The second lens driving device 20 may comprise a third coil 2120. The first mover 2100 may comprise a third coil 2120. The third coil 2120 may be an 'AF driving coil' used for AF driving. The third coil 2120 may be disposed in the second bobbin 2110. The third coil 2120 may move the second bobbin 2110. The third coil 2120 may be disposed between the second bobbin 2110 and the second housing 2210. The third coil 2120 may be disposed on an outer lateral surface or an outer circumferential surface of the second bobbin 2110. The third coil 2120 may be directly wound around the second bobbin 2110. Or, the third coil 2120 may be coupled to the second bobbin 2110 in a directly wound state. The third coil 2120 may face the second magnet 2220. The third coil 2120 may be disposed to face the second magnet 2220. The third coil 2120 may interact with the second magnet 2220 electromagnetically. In this case, when a current is supplied to the third coil 2120 and an electromagnetic field is formed around the third coil 2120, the third coil 2120 may move against the second magnet 2220 by the electromagnetic interaction between the third coil 2120 and the second magnet 2220.

The third coil 2120 may comprise a plurality of coils. The third coil 2120 may comprise two coils. The third coil 2120 may comprise a third-first and third-second coils 2221 and 2122. A third-first coil 2121 may be disposed at a position corresponding to the third lateral plate 2342-3 of the second cover 2340. The third-first coil 2121 may be disposed to face the third lateral plate 2342-3 of the second cover 2340. The third-second coil 2122 may be disposed at a position corresponding to the fourth lateral plate 2342-4 of the second cover 2340. The third-second coil 2122 may be disposed to face the fourth lateral plate 2342-4 of the second cover 2340.

In a second embodiment of the present embodiment, the third coil 2120 and the second magnet 2220 may move the second bobbin 2110 against the second housing 2210 in an optical axis direction. The third coil 2120 and the second magnet 2220 may move the second bobbin 2110 in an

optical axis direction through electromagnetic interaction. The third coil **2120** and the second magnet **2220** may be used for AF driving.

The second lens driving device **20** may comprise a coil. The coil may move the second bobbin **2110**. The coil may comprise a third coil **2120** that moves the second bobbin **2110** in an optical axis direction and a fourth coil **2330** that moves the second bobbin **2110** in a direction perpendicular to the optical axis direction.

The second lens driving device **20** may comprise a sensing magnet **2130**. The first mover **2100** may comprise a sensing magnet **2130**. The sensing magnet **2130** may be disposed in the second bobbin **2110**. The sensing magnet **2130** may be detected through the first sensor **2610**. In addition, the second lens driving device **20** may comprise a compensation magnet. The first mover **2100** may comprise a compensation magnet. The compensation magnet may be disposed to achieve magnetic force balance with the sensing magnet **2130**. The compensation magnet may have a weight corresponding to that of the sensing magnet **2130**. The compensation magnet may be disposed symmetrically with the sensing magnet **2130** with respect to an optical axis.

The second lens driving device **20** may comprise a second mover **2200**. The second mover **2200** may be movably coupled to the stator **2300** through a support member **2500**. The second mover **2200** may support the first mover **2100** through the first and second elastic members **2410** and **2420**. The second mover **2200** may move the first mover **2100** or may move together with the first mover **2100**. The second mover **2200** may move through interaction with the stator **2300**. The second mover **2200** may move during OIS driving. At this time, the second mover **2200** may be referred to as an 'OIS mover'. The second mover **2200** may move integrally with the first mover **2100** during OIS driving.

The second lens driving device **20** may comprise a second housing **2210**. The second mover **2200** may comprise a second housing **2210**. The second housing **2210** may be spaced apart from the second base **2310**. The second housing **2210** may be disposed outside the second bobbin **2110**. The second housing **2210** may accommodate at least a portion of the second bobbin **2110**. The second housing **2210** may be disposed inside the second cover **2340**. The second housing **2210** may be disposed between the second cover **2340** and the second bobbin **2110**. The second housing **2210** may be formed of a material different from that of the second cover **2340**. The second housing **2210** may be formed of an insulating material. The second housing **2210** may be formed of an injection molding material. An outer side surface of the second housing **2210** may be spaced apart from an inner surface of the lateral plate **2342** of the second cover **2340**. Through the separation space between the second housing **2210** and the second cover **2340**, the second housing **2210** may move for OIS driving. A second magnet **2220** may be disposed in the second housing **2210**. The second housing **2210** and the second magnet **2220** may be coupled by an adhesive. The first elastic member **2410** may be coupled to an upper portion or upper surface of the second housing **2210**. A second elastic member **2420** may be coupled to a lower portion or lower surface of the second housing **2210**. The second housing **2210** may be coupled to an upper portion and the second elastic members **2410** and **2420** by thermal fusion and/or an adhesive. The adhesive that couples the second housing **2210** and the second magnet **2220** and the second housing **2210** and the elastic member **2400** may be an epoxy cured by at least one among ultraviolet (UV), heat, and laser.

The second housing **2210** may comprise four side portions and four corner portions being disposed between the four side portions. The side portion of the second housing **2210** may comprise: a first side portion; a second side portion being disposed at an opposite side of the first side portion; a third side portion and a fourth side portion being disposed at an opposite side to each other between the first side portion and the second side portion. The corner portion of the second housing **2210** may comprise: a first corner portion being disposed between a first side portion and a third side portion; a second corner portion being disposed between a first side portion and a fourth side portion; a third corner portion being disposed between a second side portion and a third side portion; and a fourth corner portion being disposed between a second side portion and a fourth side portion. A side portion of the second housing **2210** may comprise a 'lateral wall'. The first side portion of the second housing **2210** may be disposed at a position corresponding to the first lateral plate **2342-1** of the second cover **2340**. The second side portion of the second housing **2210** may be disposed at a position corresponding to the second lateral plate **2342-2** of the second cover **2340**. The third side portion of the second housing **2210** may be disposed at a position corresponding to the third lateral plate **2342-3** of the second cover **2340**. The fourth side portion of the second housing **2210** may be disposed at a position corresponding to the fourth lateral plate **2342-4** of the second cover **2340**.

The second housing **2210** may comprise a hole **2211**. The hole **2211** may be hollow. The hole **2211** may be formed in the second housing **2210**. The hole **2211** may be formed to penetrate through the second housing **2210** in an optical axis direction. A second bobbin **2110** may be disposed in the hole **2211**. At least a portion of the hole **2211** may be formed in a shape corresponding to that of the second bobbin **2110**. An inner circumferential surface or an inner lateral surface of the second housing **2210** forming the hole **2211** may be spaced apart from an outer circumferential surface of the second bobbin **2110**. However, at least a portion of the second housing **2210** and the second bobbin **2110** is overlapped in an optical axis direction, so that the moving stroke distance of the second bobbin **2110** in an optical axis direction may be restricted.

The second housing **2210** may comprise a groove **2212**. The groove **2212** may accommodate at least a portion of the lower stopper **2114** of the second bobbin **2110**. The bottom surface of the groove **2212** may be overlapped with the lower stopper **2114** of the second bobbin **2110** in an optical axis direction. When the second bobbin **2110** moves downward, the lower stopper **2114** of the second bobbin **2110** may come into contact with the bottom surface of the groove **2212** of the second housing **2210**.

The second housing **2210** may comprise a hole **2213**. The hole **2213** may be a magnet accommodating groove. A second magnet **2220** may be coupled to the groove **2213**. The groove **2213** may be formed as a portion of an inner circumferential surface and/or a lower surface of the second housing **2210** is being recessed. The groove **2213** may be formed in each of the three side portions of the second housing **2210**. The groove **2213** may be formed in a second, third and fourth side portions of the second housing **2210**. The groove **2213** may be formed in a shape corresponding to the first side portion of the second housing **2210**, but in the groove **2213** being formed in a first side portion of the second housing **2210**, a dummy member **2230** other than the second magnet **2220** may be disposed.

The second housing **2210** may comprise a hole **2214**. The hole **2214** may be a through hole of a support member. The

hole **2214** may be formed in a corner portion of the second housing **2210**. The hole **2214** may be formed to penetrate through the second housing **2210** in an optical axis direction. A support member **2500** may be disposed in the hole **2214** of the second housing **2210**. The support member **2500** may pass through the hole **2214** of the second housing **2210**.

The second lens driving device **20** may comprise a second magnet **2220**. The second mover **2200** may comprise a second magnet **2220**. The second magnet **2220** may be disposed in the second housing **2210**. The second magnet **2220** may be disposed inside the second cover **2340**. The second magnet **2220** may be fixed to the second housing **2210** by an adhesive. The second magnet **2220** may be disposed between the second bobbin **2110** and the second housing **2210**. The second magnet **2220** may face the third coil **2120**. The second magnet **2220** may interact with the third coil **2120** electromagnetically. The second magnet **2220** may move the second bobbin **2110** in an optical axis direction through interaction with the third coil **2120**. The second magnet **2220** may be used for AF driving. The second magnet **2220** may face the fourth coil **2330**. The second magnet **2220** may interact with the fourth coil **2330** electromagnetically. The second magnet **2220** may move the second bobbin **2110** and the second housing **2210** in a direction perpendicular to the optical axis direction through interaction with the fourth coil **2330**. The second magnet **2220** may be used for OIS driving. The second magnet **2220** may be disposed in a plurality of side portions of the second housing **2210**. The second magnet **2220** may be a flat magnet having a flat plate shape.

The second magnet **2220** may not be disposed between the second bobbin **2110** and the first lateral plate **2342-1** of the second cover **2340**. Through this, magnetic field interference of the second magnet **2220** affecting the first lens driving device **10** can be minimized.

The second magnet **2220** may comprise a plurality of magnets. The second magnet **2220** may comprise three magnets. The second magnet **2220** may comprise a second-first to second-third magnets **2221**, **2222**, and **2223**. The second-first magnet **2221** may be disposed at the first side portion of the second housing **2210**. The second magnet **2221** may be disposed at the second side portion of the second housing **2210**. The third magnet **2221** may be disposed at the fourth side portion of the second housing **2210**. A dummy member **2230** may be disposed at the third side portion of the second housing **2210**.

The second-first magnet **2221** may face the third-first coil **2121**. The second-second magnet **2222** may face the third-second coil **2122**. The second-first and second-second magnets **2221** and **2222** may be used during AF driving. The second magnet **2220** comprises the second-first magnet **2221** being disposed at a position corresponding to the third lateral plate **2342-3** of the second cover **2340** and the fourth lateral plate **2342-4**. A second-second magnet **2222** being disposed at a corresponding position and second-third magnets **2223** being disposed at a position corresponding to the second lateral plate **2342-2** may be comprised.

The second-first magnet **2221** may face the fourth-first coil **2331**. The second-second magnet **2222** may face the fourth-second coil **2332**. The second-first and second-second magnets **2221** and **2222** may be used when driving in an OIS-x-axis direction. The second-third magnets **2223** may face the fourth-third coil **2333**. The second-third magnets **2223** may be used when driving in an OIS-y-axis direction. The area of a lower surface of the second-third magnet **2223**

may be larger than the area of a lower surface of each of the second-first magnet **2221** and the second-second magnet **2222**.

The second-first magnet **2221** and the second-second magnet **2222** may be 4-pole magnetized magnets. The second-first magnet **2221** and the second-second magnet **2222** may be 4-pole magnets. The 4-pole magnetized magnet may comprise a neutral portion being disposed horizontally in the central portion. Here, the neutral portion may be a void. The second-first magnet **2221** and the second-second magnet **2222** may be 2-pole magnetized. As the second-first magnet **2221** and the second-second magnet **2222** are 2-pole magnetized, the AF electromagnetic force can be maximized. Each of the second-first magnet **2221** and the second-second magnet **2222** may be a 4-pole magnet in which the polarity of an upper surface of an inner surface is different from that of a lower surface of an inner surface and an upper surface of an outer surface, and the polarity of a lower surface of an outer surface is the same.

The second-third magnet **2223** may be a 2-pole magnetized magnet. The second-third magnet **2223** may be a 2-pole magnet. The second-third magnet **2223** may be a 2-pole magnet having different inner and outer polarities. For an example, an inner surface of the second-third magnet **2223** may have an N pole and an outer surface of the second-third magnet **2223** may have an S pole. Conversely, an inner surface of the second-third magnet **2223** may be an S pole and an outer surface of the second-third magnet **2223** may be an N pole. However, as a modified embodiment, the second-third magnet **2223** may be a 4-pole magnet. The second-third magnet **2223** may be formed larger than each of the second-first magnet **2221** and the second-second magnet **2222**.

The second lens driving device **20** may comprise a dummy member **2230**. The second mover **2200** may comprise a dummy member **2230**. The dummy member **2230** may be disposed in the second housing **2210**. The dummy member **2230** may be disposed in a first side portion of the second housing **2210**. The dummy member **2230** may be disposed adjacent to the first lens driving device **10**. Through this, magnetic force interference between the second lens driving device **20** and the first lens driving device **10** can be minimized. The dummy member **2230** may be disposed at a position corresponding to the first lateral plate **2342-1** of the second cover **2340**.

The dummy member **2230** may have a weight corresponding to that of the second-third magnet **2223**. The dummy member **2230** may have weaker magnetic force than the second-third magnet **2223** or may not have magnetic force. The dummy member **2230** may be disposed at an opposite side of the second-third magnet **2223** in the second housing **2210**. The weight of the dummy member **2230** may correspond to the weight of the second-third magnet **2223**. However, the dummy member **2230** may have a weight lighter than that of the second-third magnet **2223**. Or, the dummy member **2230** may have a weight heavier than that of the second-third magnet **2223**. The dummy member **2230** may be within 80% of the weight of the second-third magnet **2223** to 120% of the weight of the second-third magnet **2223**. If the weight of the dummy member **2230** is less than the lower limit or exceeds the upper limit of the above-mentioned numerical value, the weight balancing of the OIS driving unit may collapse.

The dummy member **2230** may be a non-magnetic material. The dummy member **2230** may comprise a non-magnetic material. The magnetic strength of the dummy member **2230** may be weaker than that of the second-third magnet

2223. The dummy member **2230** may be disposed at an opposite side of the second-third magnet **2223** to align the center of gravity. The dummy member **2230** may be made of tungsten at least 95%. That is, the dummy member **2230** may be a tungsten alloy. For example, the specific gravity of the dummy member **2230** may be 18000 or more. The dummy member **2230** may be disposed at a position symmetrical to the second-third magnet **2223** with respect to the central axis of the second housing **2210**. At this time, the central axis of the second housing **2210** may correspond to an optical axis. The dummy member **2230** may have a thickness corresponding to that of the second-third magnet **2223** in a direction perpendicular to the optical axis.

The second lens driving device **20** may comprise a yoke **2240**. The second mover **2200** may comprise a yoke **2240**. The yoke **1240** may be disposed in the first housing **2210**. The yoke **2240** may be disposed in a first side portion of the first housing **2210**. The yoke **2240** may be disposed adjacent to the first lens driving device **10**. Through this, magnetic force interference between the first lens driving device **10** and the second lens driving device **20** can be minimized.

The second lens driving device **20** may comprise a stator **2300**. The stator **2300** may be disposed below the first and second movers **2100** and **2200**. The stator **2300** may movably support the second mover **2200**. The stator **2300** may move the second mover **2200**. At this time, the first mover **2100** can also move together with the second mover **2200**.

The first lens driving device **10** may comprise a first base **1310**. The stator **1300** may comprise a first base **1310**. The first base **1310** may be disposed below the first housing **1210**. The first base **1310** may be disposed below the first substrate **1320**. The first substrate **1320** may be disposed on an upper surface of the first base **1310**. The first base **1310** may be coupled to the first cover **1340**. The first base **1310** may be disposed on the printed circuit board **30**.

The second base **2310** may comprise a step **2311**. The step **2311** may be formed on a side surface of the second base **2310**. The step **2311** may be formed around an outer circumferential surface of the second base **2310**. The step **2311** may be formed as a portion of a side surface of the second base **2310** is protruded or recessed. A lower end of the lateral plate **2342** of the cover member **2340** may be disposed at the step **2311**.

The second base **2310** may comprise a hole **2312**. The hole **2312** may be hollow. The hole **2312** may penetrate through the second base **2310** in an optical axis direction. A light passing through the second lens **42** through the hole **2312** may be incident to an image sensor.

The second base **2310** may comprise a protrusion **2313**. The protrusion **2313** may be formed on an upper surface of the second base **2310**. The protrusion **2313** may be protruded from an upper surface of the second base **2310**. A fourth coil **2330** may be disposed in the protrusion **2313**. The fourth coil **2330** may be wound around the protrusion **2313** and disposed.

The second lens driving device **20** may comprise a second substrate **2320**. The stator **2300** may comprise a second substrate **2320**. The second substrate **2320** may be disposed in the second base **2310**. The second substrate **2320** may be disposed at one side of the second housing **2210**. The second substrate **2320** may be disposed between the second base **2310** and the second housing **2210**. The second substrate **2320** may be disposed at an upper surface of the second base **2310**. The support member **2500** may be coupled to the second substrate **2320**. The second substrate **2320** may be electrically connected to the support member **2500**. One end of the support member **2500** may be fixed to the second

substrate **2320**. The second substrate **2320** may be coupled to the printed circuit board **30** being disposed below the second base **2310** by soldering. The second substrate **2320** may comprise a flexible printed circuit board (FPCB). The second substrate **2320** may be partially bent.

The second substrate **2320** may comprise a body part **2321**. A hole may be formed in the body part **2321**. The hole may be hollow penetrating the second substrate **2320** in an optical axis direction. The second substrate **2320** may comprise a hole. A support member **2500** may be disposed in the hole of the second substrate **2320**. The support member **2500** may pass through the hole of the second substrate **2320**.

The second substrate **2320** may comprise a terminal unit. The terminal unit may be extended from an edge of the body part **2321**. The terminal unit may comprise a terminal electrically connected to the printed circuit board. The terminal unit may comprise a terminal being coupled to the printed circuit board. The terminal unit may comprise a plurality of terminal units.

The second substrate **2320** may comprise a first terminal unit **2322**. The first terminal unit **2322** may be extended downward from the body part **2321** of the second substrate **2320**. The first terminal unit **2322** may be formed by bending a part of the second substrate **2320**. At least a portion of the first terminal unit **2322** may be exposed to the outside. The first terminal unit **2322** may be coupled to the printed circuit board **30** being disposed below the second base **2310** by soldering. The first terminal unit **2322** may be disposed in a groove of the first base **2310**. The first terminal unit **2322** may comprise a plurality of terminals.

The second substrate **2320** may comprise a first terminal unit **2322** and a plurality of terminals being disposed in the first terminal unit **2322** and electrically connected to the printed circuit board **30**. The first terminal unit **2322** of the second substrate **2320** may be disposed at a position corresponding to the first lateral plate **2342-1** of the second cover **2340**. The first terminal unit **2322** of the second substrate **2320** may be disposed closest to the first lateral plate **2342-1** among the first to fourth lateral plates **2342-1**, **2342-2**, **2342-3**, and **2342-4** of the second cover **2340**.

The second substrate **2320** may comprise a second terminal unit **2323**. The second terminal unit **2323** may be disposed at an opposite side of the first terminal unit **2322**. The second terminal unit **2323** of the second substrate **2320** may be disposed at a position corresponding to the second lateral plate **2342-2** of the second cover **2340**.

The second lens driving device **20** may comprise a fourth coil **2330**. The stator **2300** may comprise a fourth coil **2330**. The fourth coil **2330** may be an 'OIS coil'. The fourth coil **2330** may move the second bobbin **2110**. The fourth coil **2330** may be disposed in the second base **2310**. The fourth coil **2330** may be disposed in the second substrate **2320**. The fourth coil **2330** may face the second magnet **2220**. The fourth coil **2330** may interact with the second magnet **2220** electromagnetically. In this case, when a current is supplied to the fourth coil **2330** and a magnetic field is formed around the fourth coil **2330**, the second magnet **2220** may move against the fourth coil **2330** due to electromagnetic interaction between the fourth coil **2330** and the second magnet **2220**. The fourth coil **2330** may move the second housing **2210** and the second bobbin **2110** in a direction perpendicular to the optical axis with respect to the second base **2310** through electromagnetic interaction with the second magnet **2220**. The second substrate **2320** may comprise a fourth coil **2330**. That is, the fourth coil **2330** may be a configuration of the second substrate **2320**. The fourth coil **2330** may be

formed as a fine pattern coil (FP coil) in a substrate separate from the second substrate **2320**.

The fourth coil **2330** may comprise a plurality of coils. The fourth coil **2330** may comprise a number of coils corresponding to those of the second magnet **2220**. The fourth coil **2330** may comprise three coils. The fourth coil **2330** may comprise a fourth-first coil **2331**, a fourth-second coil **2332**, and a fourth-third coil **2333**. The fourth-first coil **2331** may face the second-first magnet **2221**. The fourth-second coil **2332** may face the second-second magnet **2222**. The fourth-third coil **2333** may face the second-third magnet **2223**.

The number of windings of the fourth-first coil **2331** may be greater than the number of windings of the fourth-second coil **2332** and the fourth-third coil **2333**. The number of windings of the fourth-second coil **2332** may correspond to the number of windings of the fourth-third coil **2333**. In a second embodiment of the present embodiment, during OIS driving, the movement in an X-axis direction is performed through the fourth-first coil **2331** and fourth-second coil **2332**, and the movement in a Y-axis direction may be performed through the fourth-third coil **2333**. Therefore, in a second embodiment of the present embodiment, the number of turns of the fourth-third coil **2333** may be higher than the number of turns of the fourth-first coil **2331** and the fourth-second coil **2332** to compensate for insufficient driving force in a Y-axis direction. For example, a ratio between the number of turns of the fourth-third coil **2333** and the number of turns of the fourth-first and fourth-second coil **2331** and **2332** may be 1.5:2.0 to 1:1. Ideally, the ratio of the number of turns of the fourth-third coil **2333** to the number of turns of the fourth-first and fourth-second coil **2331** and **2332** is 1:1, but it can be disposed up to 1.5:2.0 due to space constraints.

The second lens driving device **20** may comprise a second cover **2340**. The stator **2300** may comprise a second cover **2340**. The second cover **2340** may comprise a 'cover can'. The second cover **2340** may comprise a yoke. The second cover **2340** may be disposed outside the second housing **2210**. The second cover **2340** may be coupled to the second base **2310**. The second cover **2340** may accommodate the second housing **2210** therein. The second cover **2340** may form the outer appearance of the second lens driving device **20**. The second cover **2340** may have a hexahedral shape with an open lower surface. The second cover **2340** may be made of a non-magnetic material. The second cover **2340** may be formed of a metal material. The second cover **2340** may be formed of a metal plate. The second cover **2340** may be connected to the ground portion of the printed circuit board **30**. Through this, the second cover **2340** may be grounded. The second cover **2340** may block electromagnetic interference (EMI). At this time, the second cover **2340** may be referred to as an 'EMI shield can'.

The second cover **2340** may comprise an upper plate **2341** and a lateral plate **2342**. The second cover **2340** may comprise an upper plate **2341** comprising a hole and a lateral plate **2342** being extended downward from an outer circumference or edge of the upper plate **2341**. The lower end of the lateral plate **2342** of the second cover **2340** may be disposed in the step **2311** of the second base **2310**. An inner surface of the lateral plate **2342** of the second cover **2340** may be fixed to the second base **2310** by an adhesive.

The lateral plate **2342** of the second cover **2340** may comprise a plurality of lateral plates. The lateral plate **2342** may comprise four lateral plates. The lateral plate **2342** of the second cover **2340** may comprise: a first lateral plate **2342-1** and a second lateral plate **2342-2** being disposed at

an opposite side to each other; and a third lateral plate **2342-3** and a fourth lateral plate **2342-4** being disposed at an opposite side to each other. The first terminal unit **2322** of the second substrate **2320** may be disposed at a position corresponding to the first lateral plate **2342-1** of the second cover **2340**. The second terminal unit **2323** of the second substrate **2320** may be disposed at a position corresponding to the second lateral plate **2342-2** of the second cover **2340**.

The second cover **2340** may comprise a groove **2343**. The groove **2343** may be formed in the lateral plate **2342** of the second cover **2340**. The groove **2343** may be formed at a lower end of the lateral plate **2342**. The groove **2343** may be formed at a position corresponding to at least one of the first terminal unit **2322** and the second terminal unit **2323**. The groove **2343** may be formed to expose at least one of the first terminal unit **2322** and the second terminal unit **2323** to the outside.

The second lens driving device **20** may comprise a terminal **2350**. The stator **2300** may comprise a terminal **2350**. The terminal **2350** may be disposed in the second base **2310**. The terminal **2350** may be electrically connected to the second substrate **2320**. The terminal **2350** may be coupled to the support member **2500**. The terminal **2350** may electrically connect the support member **2500** and the second substrate **2320**.

The second lens driving device **20** may comprise an elastic member **2400**. The elastic member **2400** may be an 'AF support member'. At least a portion of the elastic member **2400** may have elasticity. The elastic member **2400** may be formed of metal. The elastic member **2400** may be formed of a conductive material. The elastic member **2400** may connect the second bobbin **2110** and the second housing **2210**. The elastic member **2400** may elastically connect the second bobbin **2110** and the second housing **2210**. The elastic member **2400** may be coupled to the second bobbin **2110** and the second housing **2210**. The elastic member **2400** may elastically support the second bobbin **2110**. The elastic member **2400** may movably support the second bobbin **2110**. The elastic member **2400** may support the movement of the second bobbin **2110** during AF driving.

The elastic member **2400** may comprise a first elastic member **2410**. The first elastic member **2410** may be an 'upper elastic member'. The first elastic member **2410** may connect the second housing **2210** and the second bobbin **2110**. The first elastic member **2410** may be coupled to an upper portion of the second bobbin **2110** and an upper portion of the second housing **2210**. The first elastic member **2410** may be coupled to an upper surface of the second bobbin **2110**. The first elastic member **2410** may be coupled to an upper surface of the second housing **2210**. The first elastic member **2410** may be coupled to the support member **2500**. The first elastic member **2410** may be formed of a leaf spring. The first elastic member **2410** can be separated and used as a power line for electrical or communication signal.

The first elastic member **2410** may comprise a plurality of elastic units. The first elastic member **2410** may comprise three elastic units. The first elastic member **2410** may comprise first to third elastic units **2410-1**, **2410-2**, and **2410-3**. The first elastic unit **2410-1** may connect the support member **2500** and one end of the third-first coil **2121**. The second elastic unit **2410-2** may connect the other end of the third-first coil **2121** and one end of the third-second coil **2122**. The third elastic unit **2410-3** may connect the other end of the third-second coil **2122** and the support member **2500**. The first elastic member **2410** may be electrically

connected to the third coil 2120. The first elastic member 2410 may electrically connect the third coil 2120 and the support member 2500.

The first elastic member 2410 may comprise an outer side portion 2411. The outer side portion 2411 may be coupled to the second housing 2210. The outer side portion 2411 may be coupled to an upper surface of the second housing 2210. The outer side portion 2411 may comprise a hole or groove coupled to the protrusion of the second housing 2210. The outer side portion 2411 may be fixed to the second housing 2210 by an adhesive.

The first elastic member 2410 may comprise an inner side portion 2412. The inner side portion 2412 may be coupled to the second bobbin 2110. The inner side portion 2412 may be coupled to an upper surface of the second bobbin 2110. The inner side portion 2412 may comprise a hole or groove being coupled to a protrusion of the second bobbin 2110. The inner side portion 2412 may be fixed to the second bobbin 2110 by an adhesive.

The first elastic member 2410 may comprise a connecting portion 2413. The connecting portion 2413 may connect the inner side portion 2412 and the outer side portion 2411. The connecting portion 2413 may have elasticity. At this time, the connecting portion 2413 may be referred to as an 'elastic portion'. The connecting portion 2413 may comprise a shape bent two or more times.

The first elastic member 2410 may comprise a connecting portion 2414. The connecting portion 2414 may be extended from the outer side portion 2411. The connecting portion 2414 may be coupled to the support member 2500. The connecting portion 2414 and the support member 2500 may be coupled by soldering.

The elastic member 2400 may comprise a second elastic member 2420. The second elastic member 2420 may be a 'lower elastic member'. The second elastic member 2420 may be disposed below the first elastic member 2410. The second elastic member 2420 may be disposed on one side of the first elastic member 2410. The second elastic member 2420 may connect the second housing 2210 and the second bobbin 2110. The second elastic member 2420 may be disposed below the second bobbin 2110. The second elastic member 2420 may be coupled to the second bobbin 2110 and the second housing 2210. The second elastic member 2420 may be coupled to a lower surface of the second bobbin 2110. The second elastic member 2420 may be coupled to a lower surface of the second housing 2210. The second elastic member 2420 may be formed of a leaf spring. The second elastic member 2420 may be integrally formed.

The second elastic member 2420 may comprise an outer side portion 2421. The outer side portion 2421 may be coupled to the second housing 2210. The outer side portion 2421 may be coupled to a lower surface of the second housing 2210. The outer side portion 2421 may comprise a hole or groove being coupled to a protrusion of the second housing 2210. The outer side portion 2421 may be fixed to the second housing 2210 by an adhesive.

The second elastic member 2420 may comprise an inner side portion 2422. The inner side portion 2422 may be coupled to the second bobbin 2110. The inner side portion 2422 may be coupled to a lower surface of the second bobbin 2110. The inner side portion 2422 may comprise a hole or groove being coupled to a protrusion of the second bobbin 2110. The inner side portion 2422 may be fixed to the second bobbin 2110 by an adhesive.

The second elastic member 2420 may comprise a connecting portion 2423. The connecting portion 2423 may connect the inner side portion 2422 and the outer side

portion 2421. The connecting portion 2423 may have elasticity. At this time, the connecting portion 2423 may be referred to as an 'elastic portion'. The connecting portion 2423 may comprise a shape bent two or more times.

The second lens driving device 20 may comprise a support member 2500. The support member 2500 may be an 'OIS support member'. The support member 2500 may connect the first elastic member 2410 and the second substrate 2320 or the first elastic member 2410 and the terminal 2350. The support member 2500 may be coupled to an upper surface of the first elastic member 2410 and the terminal 2350. The support member 2500 may movably support the second housing 2210. The support member 2500 may elastically support the second housing 2210. At least a portion of the support member 2500 may have elasticity. The support member 2500 may elastically support the movement of the second housing 2210 and the second bobbin 2110 during OIS driving. One end portion of the support member 2500 may be coupled to the first elastic member 2410 by soldering. The other end portion of the support member 2500 may be coupled to the terminal 2350 by soldering.

The support member 2500 may comprise a plurality of wires. The support member 2500 may comprise 4 wires. The plurality of wires may comprise four wires connecting the three first elastic units 410-1, 410-2, and 410-3 and the second substrate 2320. As a modified embodiment, support member 2500 may be formed as a leaf spring.

The second lens driving device 20 may comprise a first sensor 2610. The first sensor 2610 may be disposed in the second base 2310. The first sensor 2610 may detect the sensing magnet 2130. The first sensor 2610 may be disposed in the second substrate 2320. The first sensor 2610 may be coupled to a lower surface of the second substrate 2320. The first sensor 2610 may be spaced apart from the second housing 2210. The first sensor 2610 may be spaced apart from the second bobbin 2110. The first sensor 2610 may be overlapped with the sensing magnet 2130 in an optical axis direction. The first sensor 2610 may detect the position of the sensing magnet 2130 for AF feedback control. The first sensor 2610 may be a Hall IC, a Hall element, or a Hall sensor. The first sensor 2610 may detect the magnetic force of the sensing magnet 2130.

The second lens driving device 20 may comprise a second sensor 2620. The second sensor 2620 may be disposed between the second base 2310 and the second substrate 2320. The second sensor 2620 may detect the movement of the second mover 2300. The second sensor 2620 may detect the movement of the second housing 2210 and the second magnet 2220 by detecting the magnetic force of the second magnet 2220. A detection value detected by the second sensor 2620 may be used for OIS feedback control. The second sensor 2620 may comprise a plurality of Hall sensors. The second sensor 2620 may comprise two Hall sensors. The second sensor 2620 may comprise a first Hall sensor for detecting the movement in an x-axis direction in the horizontal direction and a second Hall sensor for detecting movement in a y-axis direction in the horizontal direction.

The second lens driving device 20 may comprise a damper. The damper may be disposed in the support member 2500. The damper may be disposed in the support member 2500 and the second housing 2210. The damper may be disposed in the elastic member. The damper may be disposed in the elastic member 2400 and/or the support member 2500 to prevent a resonance phenomenon generated in the elastic member 2400 and/or the support member 2500.

Hereinafter, a configuration of a camera device according to a modified embodiment will be described with reference to drawings. Hereinafter, differences from the second embodiment of the present embodiment will be mainly described, and the description of the second embodiment of the present embodiment can be applied in analogy to the parts that has not been explained.

FIG. 34 is a schematic diagram of a camera device according to a first modified embodiment.

In a first modified embodiment, the gyro sensor 50a may be disposed adjacent to the second lens driving device 20. The gyro sensor 50a may be disposed adjacent to the third lateral plate 2342-3 of the second cover 2340 of the second lens driving device 20. The gyro sensor 50a may be disposed closer to the second lens driving device 20 than to the first lens driving device 10. The gyro sensor 50a may be disposed to be closest to the third lateral plate 2342-3 among the first to fourth lateral plates 2342-1, 2342-2, 2342-3, and 2342-4 of the second cover 2340. The gyro sensor 50a may be disposed to be closer to the second lateral plate 2342-2 than to the first lateral plate 2342-1.

FIG. 35 is a schematic diagram of a camera device according to a second modified embodiment.

In a second modified embodiment, the second substrate 2320 may comprise a first terminal unit 2322b being disposed at a position corresponding to the third lateral plate 2342-3 of the second cover 2340. The first terminal unit 2322b may be disposed to be closest to the third lateral plate 2342-3 among the first to fourth lateral plates 2342-1, 2342-2, 2342-3, and 2342-4 of the second cover 2340. The first terminal unit 2322b may be disposed in a third side surface of the second base 2310. The first terminal unit 2322b may be extended from an edge of the third region of the body part 2321 of the second substrate 2320.

The second substrate 2320 may comprise a second terminal unit 2323b being disposed at a position corresponding to the fourth lateral plate 2342-4 of the second cover 2340. The second terminal unit 2323b may be disposed to be closest to the fourth lateral plate 2342-4 among the first to fourth lateral plates 2342-1, 2342-2, 2342-3, and 2342-4 of the second cover 2340. The second terminal unit 2323b may be disposed on a fourth side surface of the second base 2310. The second terminal unit 2323b may be extended from an edge of a fourth region of the body part 2321 of the second substrate 2320.

FIG. 36 is a schematic diagram of a camera device according to a third modified embodiment.

In a second modified embodiment, the second substrate 2320 may comprise a first terminal unit 2322c being disposed at a position corresponding to the second lateral plate 2342-2 of the second cover 2340. The first terminal unit 2322c may be disposed to be closest to the second lateral plate 2342-2 among the first to fourth lateral plates 2342-1, 2342-2, 2342-3, and 2342-4 of the second cover 2340. The first terminal unit 2322c may be disposed on a second side surface of the second base 2310. The first terminal unit 2322c may be extended from an edge of a second region of the body part 2321 of the second substrate 2320.

The second substrate 2320 may comprise a second terminal unit 2323c being disposed at a position corresponding to the fourth lateral plate 2342-4 of the second cover 2340. The second terminal unit 2323c may be disposed to be closest to the fourth lateral plate 2342-4 among the first to fourth lateral plates 2342-1, 2342-2, 2342-3, and 2342-4 of the second cover 2340. The second terminal unit 2323c may be disposed on the fourth side surface of the second base

2310. The second terminal unit 2323c may be extended from an edge of a fourth region of the body part 2321 of the second substrate 2320.

FIG. 37 is a schematic diagram of a camera device according to a fourth modified embodiment.

In a fourth modified embodiment, the gyro sensor 50d may be disposed adjacent to the second lens driving device 20. The gyro sensor 50d may be disposed adjacent to the third lateral plate 2342-3 of the second cover 2340 of the second lens driving device 20. The gyro sensor 50d may be disposed to be closer to the second lens driving device 20 than to the first lens driving device 10. The gyro sensor 50d may be disposed to be closest to the third lateral plate 2342-3 among the first to fourth lateral plates 2342-1, 2342-2, 2342-3, and 2342-4 of the second cover 2340. The gyro sensor 50d may be disposed to be closer to the second lateral plate 2342-2 than to the first lateral plate 2342-1.

The first substrate 1320 may comprise a first terminal unit 1322d being disposed at a position corresponding to the third lateral plate 1342-3 of the first cover 1340. The first terminal unit 1322d may be disposed closest to the third lateral plate 1342-3 among the first to fourth lateral plates 1342-1, 1342-2, 1342-3, and 1342-4 of the first cover 1340. The first terminal unit 1322d may be disposed on a third side surface of the first base 1310. The first terminal unit 1322d may be extended from an edge of a third region of the body part 1321 of the first substrate 1320.

The first substrate 1320 may comprise a second terminal unit 1323d being disposed at a position corresponding to the fourth lateral plate 1342-4 of the first cover 1340. The second terminal unit 1323d may be disposed to be closest to the fourth lateral plate 1342-4 among the first to fourth lateral plates 1342-1, 1342-2, 1342-3, and 1342-4 of the first cover 1340. The second terminal unit 1323d may be disposed on a fourth side surface of the first base 1310. The second terminal unit 1323d may be extended from an edge of a fourth region of the body part 1321 of the first substrate 1320.

FIG. 38 is a schematic diagram of a camera device according to a fifth modified embodiment.

In a fifth modified embodiment, the first substrate 1320 may comprise a first terminal unit 1322e being disposed at a position corresponding to the second lateral plate 1342-2 of the first cover 1340. The first substrate 1320 may comprise a second terminal unit 1323e being disposed at a position corresponding to the third lateral plate 1342-3 of the first cover 1340. The second substrate 2320 may comprise a first terminal unit 2322e being disposed at a position corresponding to the third lateral plate 2342-3 of the second cover 2340. The second substrate 2320 may comprise a second terminal unit 2323e being disposed at a position corresponding to the fourth lateral plate 2342-4 of the second cover 2340.

FIG. 39 is a schematic diagram of a camera device according to a sixth modified embodiment.

In a sixth modified embodiment, the first substrate 1320 may comprise a first terminal unit 1322f being disposed at a position corresponding to the second lateral plate 1342-2 of the first cover 1340. The first substrate 1320 may comprise a second terminal unit 1323f being disposed at a position corresponding to the third lateral plate 1342-3 of the first cover 1340. The second substrate 2320 may comprise a first terminal unit 2322f being disposed at a position corresponding to the second lateral plate 2342-2 of the second cover 2340. The second substrate 2320 may comprise a second terminal unit 2323f being disposed at a position corresponding to the third lateral plate 2342-3 of the second cover 2340.

and the second terminal unit **2323p** may be disposed at a position corresponding to the fourth lateral plate **2342-4** of the second cover **2340**.

In FIG. **29 (a)**, in the first lens driving device **10**, the first terminal unit **1322q** is disposed at a position corresponding to the first lateral plate **1342-1** of the first cover **1340**, and the second terminal unit **1323q** may be disposed at a position corresponding to the second lateral plate **1342-2** of the first cover **1340**. In the second lens driving device **20**, the first terminal unit **2322q** is disposed at a position corresponding to the first lateral plate **2342-1** of the second cover **2340**, and the second terminal unit **2323q** may be disposed at a position corresponding to the second lateral plate **2342-2** of the second cover **2340**.

In FIG. **29 (b)**, in the first lens driving device **10**, the first terminal unit **1322r** is disposed at a position corresponding to the first lateral plate **1342-1** of the first cover **1340**, and the second terminal unit **1323r** may be disposed at a position corresponding to the second lateral plate **1342-2** of the first cover **1340**. In the second lens driving device **20**, the first terminal unit **2322r** is disposed at a position corresponding to the first lateral plate **2342-1** of the second cover **2340**, and the second terminal unit **2323r** may be disposed at a position corresponding to the third lateral plate **2342-3** of the second cover **2340**.

In FIG. **29 (c)**, in the first lens driving device **10**, the first terminal unit **1322s** is disposed at a position corresponding to the first lateral plate **1342-1** of the first cover **1340**, and the second terminal unit **1323s** may be disposed at a position corresponding to the second lateral plate **1342-2** of the first cover **1340**. In the second lens driving device **20**, the first terminal unit **2322s** is disposed at a position corresponding to the first lateral plate **2342-1** of the second cover **2340**, and the second terminal unit **2323s** may be disposed at a position corresponding to the fourth lateral plate **2342-4** of the second cover **2340**.

In FIG. **29 (d)**, in the first lens driving device **10**, the first terminal unit **1322t** is disposed at a position corresponding to the first lateral plate **1342-1** of the first cover **1340**, and the second terminal unit **1323t** may be disposed at a position corresponding to the second lateral plate **1342-2** of the first cover **1340**. In the second lens driving device **20**, the first terminal unit **2322t** is disposed at a position corresponding to the second lateral plate **2342-2** of the second cover **2340**, and the second terminal unit **2323t** may be disposed at a position corresponding to the fourth lateral plate **2342-4** of the second cover **2340**.

Hereinafter, an optical device according to a second embodiment of the present invention will be described with reference to the drawings.

FIG. **45** is a perspective view of an optical device according to a second embodiment of the present embodiment.

Optical devices comprise cell phones, portable phones, smart phones, portable communication devices, portable smart devices, portable terminals, digital cameras, computers, laptop computers, digital broadcasting terminals, personal digital assistants (PDAs), portable multimedia players (PMPs) and navigation. However, the type of optical device is not limited thereto, and any device for photographing a video or photo may be comprised in the optical device.

The optical device may comprise a main body **1**. The main body **1** may form the outer appearance of an optical device. The main body **1** can accommodate the camera device **2**. A display **3** may be disposed at a first surface of the main body **1**. For example, the display **3** and the camera device **2** are disposed at a first surface of the main body **1**, and a camera

device **2** may be additionally disposed at a second surface at an opposite side of the first surface of the main body **1**.

The optical device may comprise a camera device **2**. The camera device **2** may be disposed in the main body **1**. At least a portion of the camera device **2** may be accommodated inside the main body **1**. The camera device **2** may be provided in plurality. The camera device **2** may comprise dual, triple or more camera devices. The camera device **2** may be disposed at each of the first surface of the main body **1** and the second surface at an opposite side of the first surface of the main body **1**. The camera device **2** may photograph an image and/or video of a subject.

The optical device may comprise a display **3**. The display **3** may be disposed in the main body **1**. The display **3** may be disposed at a first surface of the main body **1**. The display **3** may output images and/or videos photographed by the camera device **2**.

The third embodiment of the present embodiment may comprise some configurations of the first embodiment of the present embodiment and some configurations of the second embodiment of the present embodiment. That is, the third embodiment of the present embodiment may be an embodiment in which some configurations of the first embodiment are replaced with corresponding configurations of the second embodiment. Or, the third embodiment of the present embodiment may be an embodiment in which some configurations of the second embodiment are replaced with corresponding configurations of the first embodiment.

Although the embodiment of the present invention has been described above with reference to the accompanying drawings, those of ordinary skill in the art to which the present invention belongs will understand that the present invention may be embodied in other specific forms without changing the technical spirit or essential features thereof. Therefore, it should be understood that the embodiments described above are illustrative in all respects and not restrictive.

The invention claimed is:

1. A camera device comprising:

- a printed circuit board;
 - a gyro sensor disposed on a first surface of the printed circuit board; and
 - a first lens driving device disposed on the first surface of the printed circuit board,
- wherein the first lens driving device comprises:
- a cover member comprising an upper plate and a lateral plate extending from the upper plate;
 - a bobbin disposed in the cover member;
 - a first magnet disposed in the cover member;
 - a first coil configured to move the bobbin; and
 - a substrate electrically connected with the first coil,
- wherein the lateral plate of the cover member comprises a first lateral plate and a second lateral plate disposed opposite to each other, and a third lateral plate and a fourth lateral plate disposed opposite to each other, wherein the gyro sensor is disposed closest to the first lateral plate among the first to fourth lateral plates, wherein the substrate comprises a first terminal unit comprising a plurality of terminals electrically connected with the printed circuit board,
- wherein the first terminal unit of the substrate is disposed at a position corresponding with the first lateral plate of the cover member,
- wherein the plurality of terminals of the first terminal unit are overlapped with each other in a direction parallel to the first lateral plate of the cover member, and

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wherein a shortest distance between the gyro sensor and the first lateral plate of the cover member is shorter than a size of the gyro sensor in a corresponding direction.

2. The camera device of claim 1, wherein the first lens driving device comprises a base coupled with the lateral plate of the cover member and a housing disposed between the bobbin and the cover member, and

wherein the substrate is disposed on the base.

3. The camera device of claim 2, wherein the gyro sensor is spaced apart from the cover member, the base, and the substrate.

4. The camera device of claim 1, wherein the first terminal unit is not overlapped with the gyro sensor in a direction in which the second lateral plate faces the first lateral plate, and wherein when viewed from above, the first terminal unit is hidden by the cover member and is not visible.

5. The camera device of claim 1, wherein the substrate comprises a second terminal unit disposed at an opposite side of the first terminal unit, and

wherein the second terminal unit of the substrate is disposed at a position corresponding with the second lateral plate of the cover member.

6. The camera device of claim 5, wherein a length of the first terminal unit is shorter than a length of the second terminal unit in a direction in which the third lateral plate faces the fourth lateral plate.

7. The camera device of claim 6, wherein seven or less terminals are disposed on the first terminal unit, and wherein ten or more terminals are disposed on the second terminal unit.

8. The camera device of claim 1, wherein the first lateral plate of the cover member comprises a first region close to one corner among both side corners, and a second region close to the other corner among the both side corners,

wherein the first terminal unit is disposed at a position corresponding to the first region of the first lateral plate, and

wherein the gyro sensor is disposed at a position corresponding to the second region of the first lateral plate.

9. The camera device of claim 1, wherein the first terminal unit of the substrate is omitted at a position corresponding to the gyro sensor.

10. The camera device of claim 1, wherein the first terminal unit of the substrate is disposed closest to the first lateral plate among the first to fourth lateral plates.

11. The camera device of claim 1, wherein the first coil is configured to move the bobbin in an optical axis direction, and

wherein the first lens driving device comprises a second coil configured to move the bobbin in a direction perpendicular to the optical axis direction.

12. The camera device of claim 1, comprising a second lens driving device disposed on the first surface of the printed circuit board,

wherein the second lens driving device is disposed closest to the third lateral plate among the first to fourth lateral plates.

13. The camera device of claim 12, wherein the first magnet is disposed at a position corresponding to the first lateral plate,

wherein the first lens driving device comprises a dummy member disposed at a position corresponding to the third lateral plate,

a second magnet disposed at a position corresponding to the second lateral plate, and a third magnet disposed at a position corresponding to the fourth lateral plate, and

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wherein the dummy member has a weight corresponding with the third magnet and has a magnetic force weaker than the third magnet or no magnetic force.

14. The camera device of claim 12, wherein the first terminal unit is disposed between the gyro sensor and the second lens driving device.

15. The camera device of claim 1, wherein the printed circuit board comprises a first portion disposed with the first lens driving device, a second portion disposed with a connector, and a third portion connecting the first portion and the second portion, and

wherein the third portion is disposed closest to the second lateral plate among the first to fourth lateral plates.

16. The camera device of claim 1, comprising: an image sensor disposed on the printed circuit board; and a lens coupled to the bobbin.

17. An optical device comprising:

a main body;

the camera device of claim 1 disposed on the main body; and

a display disposed on the main body and configured to output an image by the camera device.

18. A camera device comprising:

a printed circuit board;

an image sensor disposed on the printed circuit board;

a gyro sensor disposed on a first surface of the printed circuit board;

a first lens driving device disposed on the first surface of the printed circuit board; and

a second lens driving device disposed on the first surface of the printed circuit board,

wherein the first lens driving device comprises:

a cover member comprising an upper plate and a lateral plate extending from the upper plate;

a first magnet disposed in the cover member;

a first coil disposed in the cover member; and

a substrate electrically connected with the first coil,

wherein the lateral plate of the cover member comprises a first lateral plate and a second lateral plate disposed opposite to each other, and a third lateral plate and a fourth lateral plate disposed opposite to each other, wherein the second lens driving device is disposed closest to the third lateral plate among the first to fourth lateral plates,

wherein the gyro sensor is disposed closest to the first lateral plate among the first to fourth lateral plates,

wherein the substrate comprises a first terminal unit disposed closest to the first lateral plate among the first to fourth lateral plates,

wherein the first terminal unit comprises a plurality of terminals electrically connected with the printed circuit board,

wherein the plurality of terminals of the first terminal unit are overlapped with each other in a direction parallel to the first lateral plate of the cover member, and

wherein a shortest distance between the gyro sensor and the first lateral plate of the cover member is shorter than a size of the gyro sensor in a corresponding direction.

19. The camera device of claim 18, wherein the first terminal unit is not overlapped with the gyro sensor in a direction in which the second lateral plate faces the first lateral plate, and

wherein when viewed from above, the first terminal unit is hidden by the cover member and is not visible.

20. The camera device of claim 18, wherein the substrate comprises a second terminal unit disposed at an opposite side of the first terminal unit,

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wherein the second terminal unit of the substrate is disposed closest to the second lateral plate among the first to fourth lateral plates, and

wherein a length of the first terminal unit is shorter than a length of the second terminal unit in a direction in which the third lateral plate faces the fourth lateral plate.

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